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Coquille Ocean Dredged Material Disposal Site (ODMDS) Designation. Final Environmental Impact Statement

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This final EIS provides information to support designation of an ocean dredged material disposal site (ODMDS) in the Pacific Ocean off the mouth of the Coquille River in the state of Oregon. The proposed ODMDS is an adjusted location lying north-northeast of an existing, interim-designated site. Site designation studies were conducted by the Portland District, Corps of Engineers, in consultation with Region 10, EPA. The adjusted ODMDS was judged to be a safer location with less potential for adverse environmental effects. No significant or long term adverse environmental effects are predicted to result from designation. The designated ODMDS would continue to receive sediments dredged by the Corps of Engineers to maintain the federally authorized navigation project at Coquille River, Oregon, and other dredged materials authorized in accordance with Section 103 or the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA). Designation of an ODMDS does not constitute or imply approval of an actual disposal of material. Before any disposal may occur, a specific evaluation by Corps must be made using EPA's ocean dumping criteria. EPA makes an independent evaluation of the proposal and has the right to disapprove the actual disposal.

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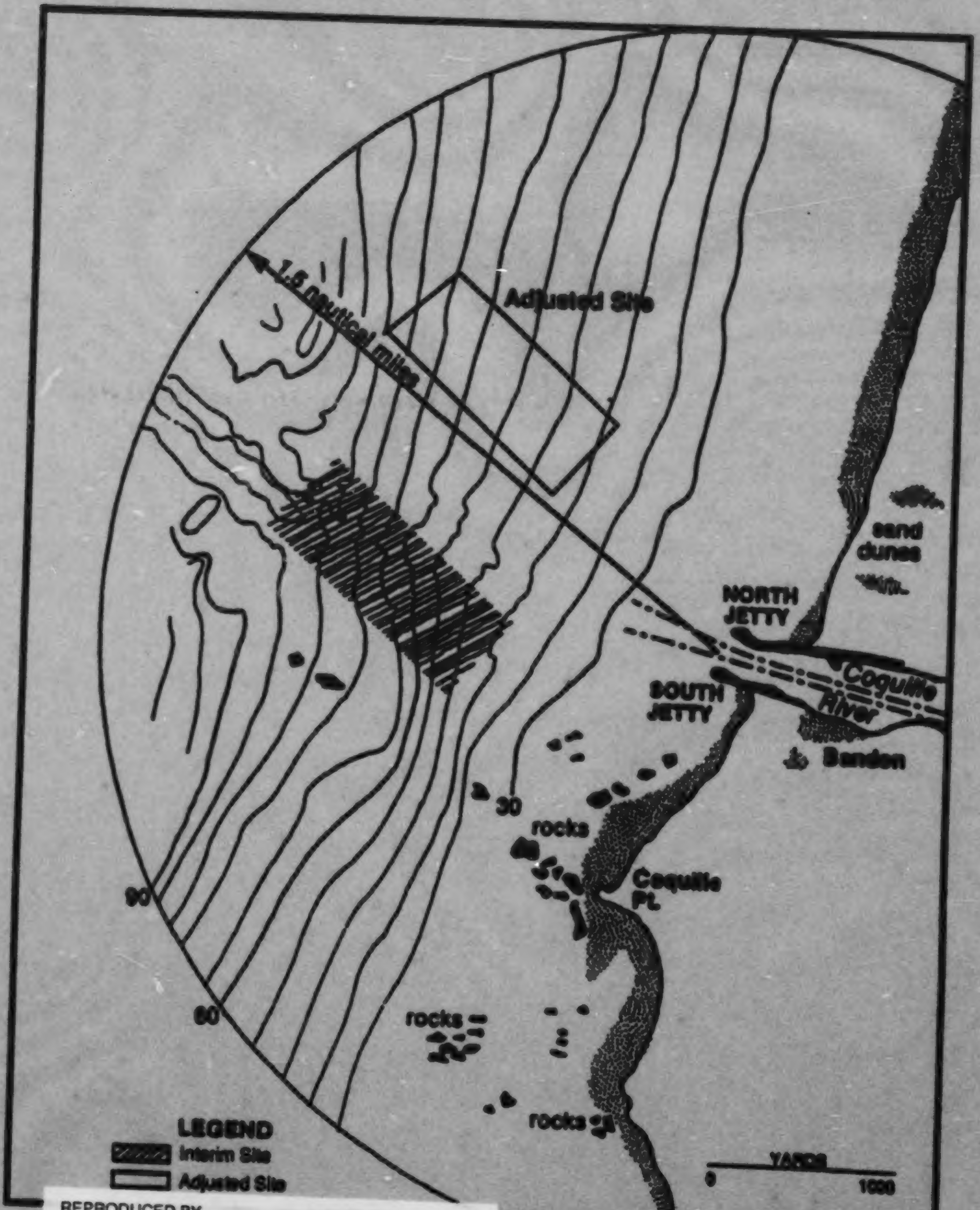
Coquille, Oregon Dredged Material Disposal Site Designation

Final Environmental Impact Statement



1.5 nautical miles
Adjusted Site
sand dunes
NORTH JETTY
SOUTH JETTY
Coquille River
Bandon
30
rocks
Coquille Pt.
90
60
rocks
rocks
LEGEND
Interim Site
Adjusted Site
YARDS
0
1000

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FINAL

ENVIRONMENTAL IMPACT STATEMENT

COQUILLE OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) DESIGNATION

Prepared by

U.S. ENVIRONMENTAL PROTECTION AGENCY (Region 10)

With Technical Assistance From

U.S. Army, Corps of Engineers
Portland District

COVER SHEET

Final

ENVIRONMENTAL IMPACT STATEMENT

COQUILLE OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) DESIGNATION

Lead Agency: U.S. Environmental Protection Agency, Region 10

Responsible Official:

Thomas P. Dunne
Acting Regional Administrator
Environmental Protection Agency
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Seattle, Washington 98101

Abstract:

This final EIS provides information to support designation of an ocean dredged material disposal site (ODMDS) in the Pacific Ocean off the mouth of the Coquille River in the State of Oregon. The proposed ODMDS is an adjusted location lying north-northeast of an existing, interim-designated site. Site designation studies were conducted by the Portland District, Corps of Engineers, in consultation with Region 10, EPA. The adjusted ODMDS was judged to be a safer location with less potential for adverse environ-mental effects. No significant or long-term adverse environmental effects are predicted to result from the designation. The designated ODMDS would continue to receive sediments dredged by the Corps of Engineers to maintain the federally-authorized navigation project at Coquille River, Oregon, and other dredged materials authorized in accordance with Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA). Designation of an ODMDS does not constitute or imply approval of an actual disposal of material. Before any disposal may occur, a specific evaluation by the Corps must be made using EPA's ocean dumping criteria. EPA makes an independent evaluation of the proposal and has the right to disapprove the actual disposal.

Public Review and Comment Process:

The draft EIS was offered for review and comment to members of the public, special interest groups, and government agencies. No public hearings/meetings were scheduled. Comments received on this draft EIS have been addressed in this final document. Comments or questions may be directed to:

John Malek
Ocean Dumping Coordinator
Environmental Protection Agency
1200 Sixth Avenue, WD-138
Seattle, Washington 98101

Telephone: (206) 442-1286

EXECUTIVE SUMMARY

Site Designation. Section 102(c) of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 *et seq.* (MPRSA), gives the Administrator of the U.S. Environmental Protection Agency (EPA) the authority to designate sites where ocean dumping may be permitted. On October 1, 1986, the Administer delegated the authority to designate ocean dumping sites to the Regional Administrator of the Region in which the site is located. EPA has voluntarily committed to prepare EISs in connection with ocean dumping site designations (39 FR 16186, May 7, 1974).

The draft environmental impact statement (EIS) was prepared by Region 10, EPA, with the cooperation of the Portland District, U.S. Army Corps of Engineers and was circulated to the public for comment. Concurrently, a draft rule was prepared. The draft rule and notice of availability for the draft EIS were published in the **Federal Register** on November 10, 1988. The draft and this final EIS provide documentation to support final designation of an ocean dredged material disposal site (ODMDS) for continuing use to be located off the mouth of the Coquille River, Oregon. This final document evaluates the proposed Coquille ODMDS site based on criteria and factors set forth in 40 CFR 228.5 and 228.6 and after consideration of public comments provided on the draft EIS and rule. This EIS makes full use of existing information to discuss various criteria, supplemented by field data to describe environmental conditions within and adjacent to the site.

As a separate but concurrent action, EPA will publish the final rule in the **Federal Register** for formal designation of the adjusted Coquille ODMDS.

Major Conclusions and Findings. The preferred ODMDS for final designation is an adjusted location 1,500 feet north-northeast of the existing, interim site. The adjusted site, when designated, will be used for disposal of sediments dredged by the Corps to maintain the federally authorized navigation project at Coquille River, Oregon, and for disposal of materials dredged during other actions authorized in accordance with Section 103 of the MPRSA. The adjusted ODMDS site proposed for designation is located in an area more suitable than the interim site in terms of environmental and navigational safety factors.

Disposal of the dredged sediments is a necessary component of maintaining the navigation project. An evaluation of disposal alternatives was conducted. No less environmentally damaging, economically feasible alternative to ocean disposal for material dredged from the entrance to the Coquille River project was identified. In addition, use of ocean disposal for other channel reaches and by other dredgers may be expected to increase as other disposal options are exhausted. Designation of an ODMDS is necessary to accommodate this need.

Three alternatives for ocean disposal were considered for the Coquille ODMDS.

1) Termination of ocean disposal at Coquille.
2) Designation of the existing interim ODMDS.
3) Designation of an adjusted ODMDS.

Based on the evaluation of need and an assessment of environmental impacts from historic dredged material disposal, termination of ocean disposal at Coquille was not considered prudent or reasonable. Evaluation focussed on the existing interim ODMDS, the adjusted ODMDS proposed for designation, and consideration of an ODMDS beyond the continental shelf. The procedures used to evaluate these options consisted of evaluating each of the five general and eleven specific criteria as required in 40 CFR 228.5 and 228.6. Use of an ODMDS beyond the continental shelf provided no environmental advantages and incurred significant economic costs.

The interim site, or areas in the same vicinity, have been used since 1897. Since then a total of about 2.4 million cy have been disposed in the general area of the ODMDS, of which 509,000 cy have been disposed since the existing site received its interim designation in 1977. This interim designation was published in 40 CFR 228.12 and identified the following corner coordinates for the site:

43 deg. 07' 54" N.	124 deg. 27' 04" W.
43 deg. 07' 30" N.	124 deg. 26' 27" W.
43 deg. 07' 20" N.	124 deg. 26' 40" W.
and 43 deg. 07' 44" N.	124 deg. 27' 17" W.

The interim site is located approximately 1 mile from the entrance, with dimensions of 3,600 feet by 1,400 feet, average depth of 60 feet, and southeast-northwest orientation along its long axis. The site occupies approximately 116 acres (.13 sq nautical miles).

Field data collected to support designation of the interim site and interviews with vessel operators revealed safety and environmental concerns with its location. This is due to its proximity to rocky substrate and pinnacles associated with Coquille Point and the Oregon Islands National Wildlife Refuge to the south. As a result, an adjusted location was defined and is proposed for final site designation. The adjusted site has the following corner and centroid coordinates:

43 deg. 08' 26" N.	124 deg. 26' 44" W.	
43 deg. 08' 03" N.	124 deg. 26' 08" W.	
43 deg. 08' 13" N.	124 deg. 27' 00" W.	
and 43 deg. 07' 50" N.	124 deg. 26' 23" W.	
43 deg. 08' 08" N.	124 deg. 26' 34" W.	(centroid)

The adjusted site is located approximately 1,500 feet north-northeast of the interim site, also approximately 1 mile from the entrance. Its dimensions are slightly larger than the interim site, 3,500 feet by 1,750 feet, and occupies approximately 150 acres (.17 sq nautical miles). Average depth and southeast-northwest orientation are similar to the interim site.

After applying the five general and eleven specific criteria to the available options, designation of the adjusted ODMDS was selected as the preferred alternative. Continued use of the interim ODMDS would not be expected to cause unacceptable adverse environmental effects. The interim disposal site encompasses large areas of exposed rock and scattered rock outcrops as well as areas covered by fine sand. The extent of rock exposures and proximity to reef shoals presents both a hazard to the hopper dredges and potential for some adverse environmental impacts. The adjusted site does not have these concerns and is therefore considered the better site.

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I. INTRODUCTION

This final environmental impact statement (EIS) was prepared by Region 10, U.S. Environmental Protection Agency (EPA), with the cooperation of the Portland District, U.S. Army Corps of Engineers (Corps). Section 102(c) of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 et seq. (MPRSA), gives the Administrator of the EPA the authority to designate sites where ocean dumping may be permitted. On October 1, 1986, the Administer delegated the authority to designate ocean dumping sites to the Regional Administrator of the Region in which the site is located. EPA has voluntarily committed to prepare EISs in connection with ocean dumping site designations (39 FR 16186, May 7, 1974).

Disposal site studies were designed and conducted by the Corps, in consultation with EPA, and a Site Evaluation Report was prepared and coordinated by the Corps. That Site Evaluation Report described conditions in the vicinity of the existing interim ocean dredged material disposal site (ODMDS) at Coquille River, Oregon. The Coquille ODMDS received its interim designation from EPA in 1977 (40 CFR 228.12). The MPRSA requires that, for a site to receive a final ODMDS designation, the site must satisfy the specific and general disposal site criteria set forth in 40 CFR 228.6 and 228.5, respectively. The Corps report proposed that an ODMDS in an adjusted location 1,500 feet north-northeast from the existing ODMDS be designated by EPA. The report also documented compliance of the proposed ODMDS with requirements of the following laws:

Endangered Species Act of 1973,
National Historic Preservation Act of 1966, and the
Coastal Zone Management Act of 1972, all as amended.

That document was submitted to EPA for review and processing for formal designation by the Regional Administrator, Region 10. The Corps' Site Evaluation Report was used as the basis of the draft EIS. Comments received during public review of the draft EIS have been responded to in this final document. Technical appendices from the Corps' report are included as appendices to this EIS.

II. PURPOSE AND NEED

General. This final EIS provides documentation to support final designation of an ocean dredged material disposal site (ODMDS) for continuing use to be located off the mouth of the Coquille River, Oregon. This document evaluates the proposed Coquille ODMDS site based on criteria and factors set forth in 40 CFR 228.5 and 228.6 as required by the Ocean Dumping Regulations (ODR) promulgated in the **Federal Register** on January 11, 1977, in accordance with provisions set forth in Sections 102 and 103 of the MPRSA. This EIS makes full use of existing information to discuss various criteria, supplemented by field data to describe environmental conditions within and adjacent to the site. Comments received during public review of the draft EIS have been responded to and are included in section VI of this document.

The preferred ODMDS for final designation is an adjusted location 1,500 feet north-northeast of the existing, interim site. The adjusted site, when designated, will be used for disposal of sediments dredged by the Corps to maintain the federally authorized navigation project at Coquille River, Oregon, and for disposal of materials dredged during other actions authorized in accordance with Section 103 of the MPRSA. The adjusted ODMDS site proposed for designation is located in an area more suitable than the interim site in terms of environmental and navigational safety factors.

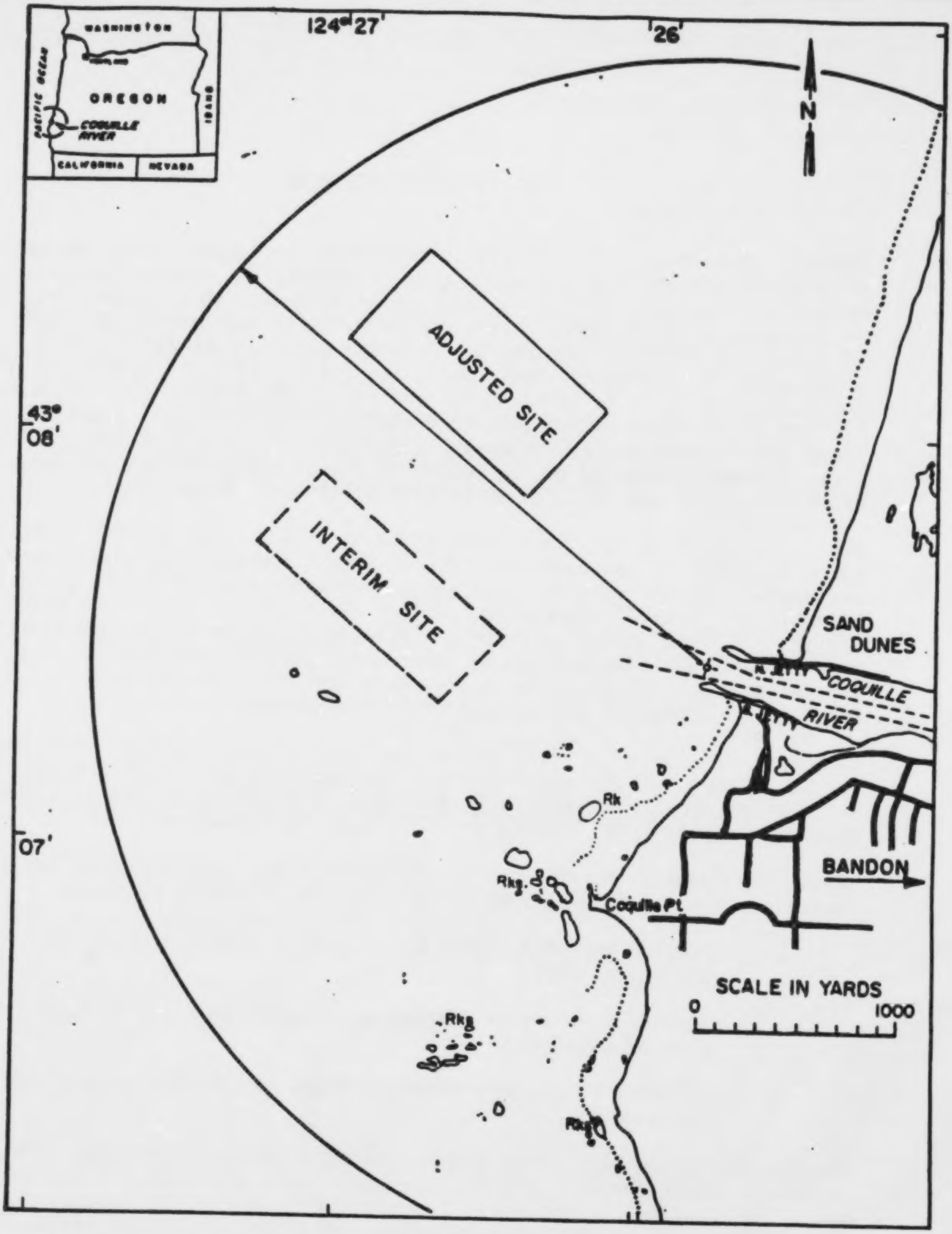
Location. The Coquille River enters the Pacific Ocean north of the town of Bandon, Oregon, and 226 miles south of the mouth of the Columbia River (figure 1). The estuary is fed mainly by the Coquille River, which drains 1,058 square miles and is 99.1 miles from its mouth to headwaters.

Need. The Corps is responsible for maintaining the Coquille River navigation channel, which was federally authorized for the following purposes:

- Provide entrance depths sufficient to accommodate vessels of economical size.
- Provide a navigable channel up to Coquille River Mile 24, to the town of Coquille.
- Increase safety by removing shallow rock pinnacles near the river entrance.

The project further serves to decrease waiting times and increase safety for vessels crossing the bar, and is one of the harbors of refuge along the Oregon coast. Maintenance of the navigation channel to authorized depths is critical to keeping the river and harbor open and sustaining vital components of the local and state economy.

Disposal of the dredged sediments is a necessary component of maintaining the navigation project. An evaluation of disposal alternatives was conducted and is contained in Section III. Alternatives. No less environmentally damaging,


WASHINGTON
PORTLAND
OREGON
PACIFIC OCEAN
IDAHO
COQUILLE RIVER
CALIFORNIA
NEVADA
124° 27'
26'
N
43° 08'
07'
ADJUSTED SITE
INTERIM SITE
SAND DUNES
COQUILLE
RIVER
Rk
Rks.
Coquille Pt.
BANDON
SCALE IN YARDS
0
1000
Rks
Rks

ADJUSTED LOCATION FOR FINAL SITE DESIGNATION
FIGURE 1

economically feasible alternative to ocean disposal for material dredged from the entrance to the Coquille River was identified. In addition, use of ocean disposal for other channel reaches and by other dredgers may be expected to increase as other disposal options are exhausted. Designation of an ODMDS is necessary to accommodate this need.

Project History. The existing dredging project was initially authorized by Congress in 1910, although dredging had begun at the entrance in 1897. The portion of the authorized project that will most potentially generate dredged sediments for ocean disposal is the channel presently authorized to 13 feet deep and of suitable width from deep water to River Mile (RM) 1.3. Because of navigation needs at Coquille, two rubble mound jetties were constructed. The 3,450-foot-long north jetty was begun in 1883, completed in 1908, and was extended in both 1940 and 1951. The 2,700-foot-long south jetty was built in 1899 and extended in 1940. Snagging operations are authorized to clear the channel up to RM 24.

The frequency of maintenance dredging depends on the volume of sediments transported from upriver into the estuary and frequency and severity of storms that move offshore sediments into the channel, creating a bar. Typically, a shoal forms between the jetty ends, building from the north jetty to mid- and, in some years, full-channel. A second shoal forms completely across the channel between RM 0.2 and 0.5. Sediments are fine to medium sands. Average annual volume of dredged material deposited offshore at Coquille from 1976 to 1985 has been 59,123 cubic yards (cy), with a range of 2,500 to 115,910 cy placed in the ODMDS each year. Annual volumes are given in appendix B, table B-1.

The Corps is studying the need to deepen the Coquille River entrance channel and has prepared a Detailed Project Report (DPR) for the proposed project. The DPR recommended deepening the entrance bar to -18 feet NGVD for a length of 1,200 feet. An estimated 74,000 cy would be dredged during initial construction and average maintenance dredging requirements would increase an estimated 20,000 cy per year. The draft DPR was distributed for public review on March 5, 1987; a final DPR was completed in May, 1987.

Historical ODMDS Use. The interim site, or areas in the same vicinity, have been used since 1897. Dredging began in that year when the Corps had a contractor remove shoals in the main channel. Dredging of the entrance bar began at Coquille in 1920. Since then a total of about 2.4 million cy have been disposed in the general area of the ODMDS, of which 509,000 cy have been disposed since the existing site received its interim designation in 1977. This interim designation was published in 40 CFR 228.12 and identified the following corner coordinates for the site:

43 deg. 07' 54" N.	124 deg. 27' 04" W.
43 deg. 07' 30" N.	124 deg. 26' 27" W.
43 deg. 07' 20" N.	124 deg. 26' 40" W.
and 43 deg. 07' 44" N.	124 deg. 27' 17" W.

The interim site is located approximately 1 mile from the entrance, with dimensions of 3,600 feet by 1,400 feet, average depth of 60 feet, and southeast-northwest orientation along its long axis. The site occupies approximately 116 acres (.13 sq nautical miles).

Field data collected to support designation of the interim site and interviews with vessel operators revealed safety and environmental concerns with its location. This is due to its proximity to rocky substrate and pinnacles associated with Coquille Point and the Oregon Islands National Wildlife Refuge to the south. As a result, an adjusted location was defined and is proposed for final site designation (figure 1). The adjusted site has the following corner and centroid coordinates:

43 deg. 08' 26" N.	124 deg. 26' 44" W.	
43 deg. 08' 03" N.	124 deg. 26' 08" W.	
43 deg. 08' 13" N.	124 deg. 27' 00" W.	
and 43 deg. 07' 50" N.	124 deg. 26' 23" W.	
43 deg. 08' 08" N.	124 deg. 26' 34" W.	(centroid)

The adjusted site is located approximately 1,500 feet north-northeast of the interim site, also approximately 1 mile from the entrance. Its dimensions are slightly larger than the interim site, 3,500 feet by 1,750 feet, and occupies approximately 150 acres (.17 sq nautical miles). Average depth and southeast-northwest orientation are similar to the interim site.

III. ALTERNATIVES

General. Under the MPRSA, designation of ocean dumping sites follow specific requirements. In conjunction with the MPRSA, the Ocean Dumping Regulations, as well as related EPA and Corps policies, must be followed. Guidance for the evaluation process has been provided by the joint EPA/Corps workbook (1984). This process generally involved three major phases. Phase I includes delineation of the general area or Zone of Siting Feasibility (ZSF), i.e., disposal is economically and technically feasible. The ZSF is determined by establishing the reasonable haul distance, considering factors such as available dredging equipment, energy use constraints, costs, and safety concerns. Existing information on resources, uses, and environmental concerns are reviewed and critical resources and areas of incompatibility identified. Phase II involves identification of candidate sites within the ZSF based on information evaluated in Phase I. Additional studies can be conducted to further evaluate environmental and other factors, such as disposal site management considerations. Phase III consists of evaluation of candidate sites and selection of preferred site(s) for formal designation by EPA. Preparation of this EIS and the designation rule is part of Phase III.

Constraints. Dredging of the coastal ports is limited to a season from May through September. That limit is imposed by the weather and sea states that predominate in the Northwest. The size of the ZSF is controlled by the capability and availability of dredging equipment as allocated among nine Oregon coastal projects, and the haul distance. The limited operating time available for completing the maintenance dredging along the Oregon coast, therefore, requires a combination of government and private dredges. In a typical year, the Coquille project requires equipment which will permit production of 6,000 cy per day or approximately 14 days of work. Longer hauling distances increase vessel operating costs and increase the time required for completion of the work. Based on these factors, the limit of the Coquille ZSF from a practical economic viewpoint is 1.5 nautical miles.

Resource Considerations. The natural and cultural resources of the area within the ZSF were identified from information obtained through review of literature, interviews with resource agencies, local users and through site-specific studies (appendix A). Critical information was evaluated and mapped to identify areas of resource conflict. The selection of resources to use for this determination was dependent on whether the resource was considered limited. A coast-wide resource, i.e., flat fish spawning area, was not considered a limited resource and was not included in the overlay evaluation technique.

Equipment Considerations. A hopper dredge must be used for maintenance work near the river entrance because the rough seas encountered at the entrance are not suitable for safe operation of a pipeline dredge. With a hopper dredge, dredged material disposal would normally occur at an in-water site. There are no suitable sites in the estuary because of its narrowness and shallowness. Disposal of entrance material inside the estuary would have greater adverse environmental impacts than ocean disposal because estuarine habitats are generally more productive and far less extensive than are nearshore oceanic habitats. Disposal of the material inside the estuary would also increase the risk of the material eroding and reshoaling in the channel, potentially increasing dredging requirements.

Consideration of Upland Disposal Options. Upland disposal of entrance channel material typically is not feasible for economic and environmental reasons. Upland sites with large capacity seldom exist at such locations. More distant upland sites incur substantially greater costs for rehandling and transportation of the material and alteration of the sites normally involves some environmental impact. Creation of a rehandling area also may involve substantial environmental effects through alteration of marine or estuarine habitats. Another potential adverse impact of upland disposal is that the sediments would be removed from the littoral system and could result in erosion of nearby shorelines over the long term.

Upland disposal was evaluated as an alternative to designation of an ODMDS. A potential upland site was located on the north side of the Coquille estuary. However, because a hopper dredge will be used to dredge the entrance channel, direct discharge to the site is not possible. An in-water sump would need to be dredged and the material bottom dumped into it, then pumped ashore with a pipeline suction dredge. This would increase costs and also would incur additional adverse environmental impacts by dredging the rehandling site in the estuary. Therefore, ocean disposal would appear to be the most practicable disposal alternative at Coquille if the authorized channel is to be maintained. Upland disposal will also continue to be evaluated as a potential alternative for specific disposal actions.

Ocean Disposal Options. Three alternatives for ocean disposal were considered for the Coquille ODMDS.

1) Termination of ocean disposal at Coquille.
2) Designation of the existing interim ODMDS.
3) Designation of an adjusted ODMDS.

Based on the evaluation of need and an assessment of environmental impacts from historic dredged material disposal, termination of ocean disposal at Coquille is not considered prudent or reasonable. Accordingly, evaluation focussed on the existing interim ODMDS, the candidate adjusted ODMDS proposed for designation, and consideration of an adjusted ODMDS beyond the continental shelf. The procedures used to evaluate these options consisted of evaluating each of the five general and eleven specific criteria as required in 40 CFR 228.5 and 228.6.

Application of General Criteria. Potential ODMDS sites were evaluated in terms of the following general criteria.

Minimal Interference With Other Activities. The first of the five criteria requires that a determination be made as to whether the site will minimize interference of the proposed disposal operations with other uses of the marine environment. This determination was made by overlaying several individual maps presented in the technical appendices onto a base map showing bathymetry and location of the interim disposal site and the ZSF. The following were evaluated as potential incompatibilities or resources of limited distribution.

- Navigation Hazards Area/Other Recreation Areas
- Shellfish Areas
- Critical Aquatic Resource
- Commercial and Sport Fishing Areas
- Geological Features
- Cultural and Historical Areas

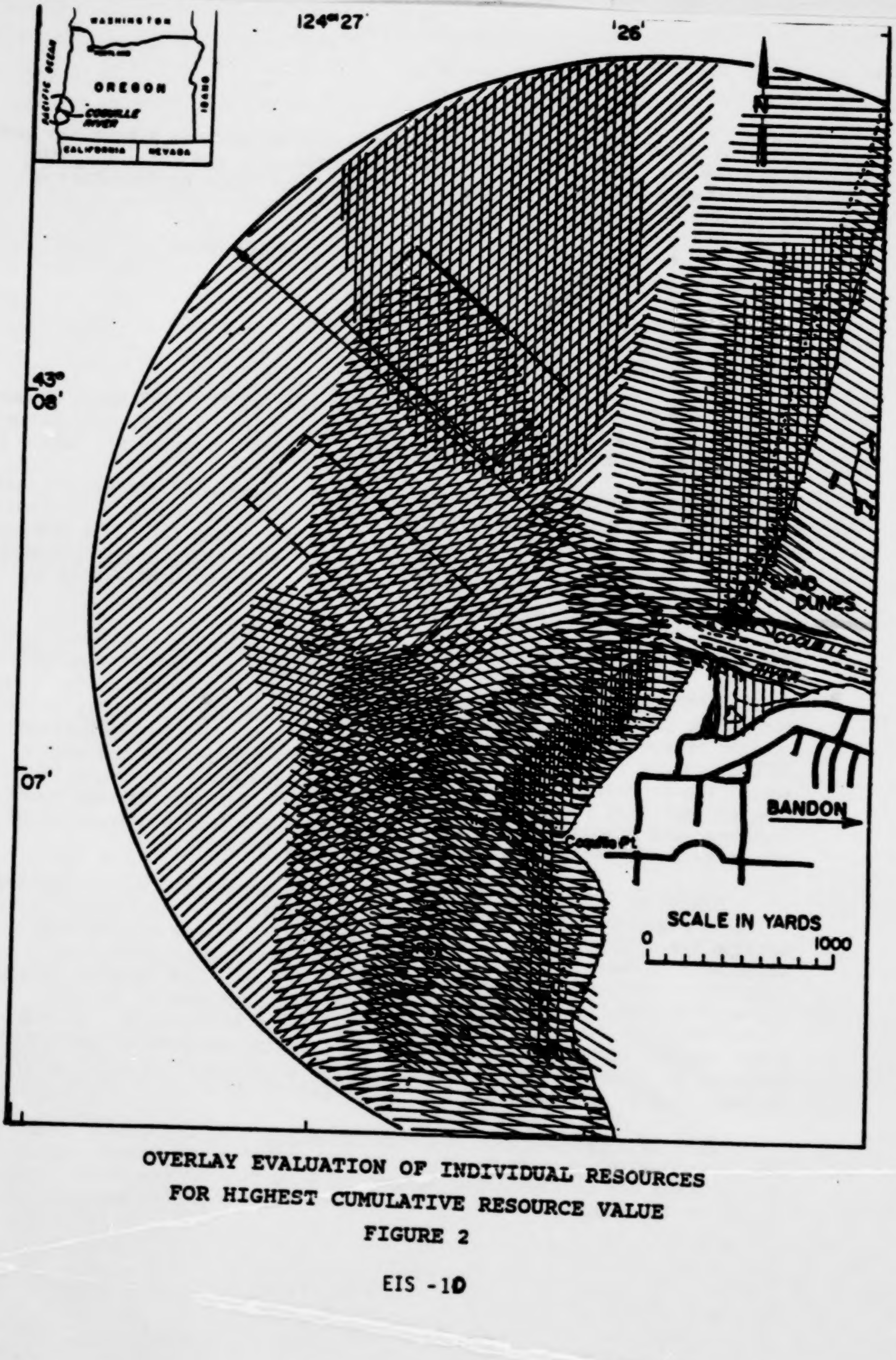
Figure 2 shows the results of overlaying of each of the individual resources to identify areas of highest cumulative resource interaction. The darker the area the more interactions between various limited resources are taking place.

The existing interim site at Coquille lies in a region of extreme navigation hazard due to exposed and partially exposed reefs. In addition to presenting hazards to navigation, these are unusual features along the coast and support a variety of aquatic organisms, including bull kelp (Nerocystis lutkeana) and its associated fish and invertebrate community. The alternate site may lie at the southern end of a squid spawning area.

Most of the ZSF is within the area utilized by commercial and sport salmon fishing. This area is commercially fished summer and fall of each year (actual length of the fishing season is set annually by the Pacific Fisheries Management Council). Disposal operations can take place from May through October of each year. There is an overlap of times, but communications with ODFW personnel indicate no observable conflicts between the two uses of the area. The recreation salmonid fishery is not concentrated in one location or time of year, and there have been no observable conflicts between sports fishermen and disposal operations. Appendix A provides a discussion of all potential conflicts within the ZSF with living resources.

Minimizes Changes in Water Quality. The second of the five general criteria requires that changes to ambient seawater quality levels occurring outside the disposal site be within water quality standards and that no detectable contaminants reach beaches, shorelines, sanctuaries, or geographically limited fisheries or shellfisheries. The material from the entrance channel is characterized as clean sand; because of this no contaminants or suspended solids are expected to be released. No significant water quality perturbations are expected. Bottom movement of deposited material is discussed in Appendix B and, in general, shows a net offshore movement rather than moving toward a limited resource.

Interim Sites Which Do Not Meet Criteria. The evaluation indicates that the interim disposal site may not meet the criteria and factors established in 40 CFR 228.5 due to navigation hazards in a portion of the site. Concern for safety of the hopper dredge when the hopper doors are open suggests that it


WASHINGTON
PORTLAND
OREGON
PACIFIC OCEAN
IDAHO
COQUILLE RIVER
CALIFORNIA
NEVADA
124°27'
'26'
43°
08'
07'
N
SAND DUNES
COQUILLE
RIVER
BANDON
Coquille Pt.
SCALE IN YARDS
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OVERLAY EVALUATION OF INDIVIDUAL RESOURCES FOR HIGHEST CUMULATIVE RESOURCE VALUE

FIGURE 2

would be prudent to adjust the site slightly to the north away from the subsurface rocks. In addition, discharge at theinterim site may be impacting aquatic resources associated with those rocky habitats. While the site may be environmentally acceptable for the present types and quantities of dredged material it receives on an annual basis, a less potentially damaging alternative location exists and is considered preferable to the interim site.

Size of Sites. The size, configuration, and location of the site was evaluated as part of the study. The adjusted Coquille site proposed for designation is 3,500 feet long and 1,750 feet wide and encompasses approximately 150 acres. It is similar in size, shape, and location to the other interim ODMDS located along the Oregon coast. Both the interim and adjusted ODMDS are dispersive. The interim site has handled the volumes of material received annually in the past. Although volumes of material going to the ODMDS are expected to increase slightly in the future as alternative disposal options are exhausted, this increase is not expected to seriously impact site capacity or resources outside the ODMDS. Public notices issued by the Corps for ocean disposal operations at various federally-authorized projects, as required by MPRSA, have not generated concerns about undue impacts from their use. Both Coquille ODMDS are located close enough to shore and harbor facilities that monitoring and surveillance programs, if required, could easily be accomplished. Disposal practices could be altered or site boundaries adjusted if warranted.

Sites Off The Continental Shelf. Any possible disposal sites off the continental shelf near Oregon are at least 20 nautical miles offshore. The ZSF for Coquille was defined after determining the economical haul distance (1.5 nautical miles) from shore. While there may be some flexibility in operations that could increase the haul distance somewhat, the minimum 20 nautical mile haul to utilize a continental slope disposal site is economically prohibitive. The cost involved would make the federally-authorized Coquille River project infeasible. The purpose of such a site preference is to minimize environmental impacts from ocean dumping. In this instance, evaluation of historic ocean dumping of dredged material did not reveal actual or potential resource conflicts or unacceptable adverse environmental effects due to ocean dumping of Coquille material at the proposed adjusted ODMDS. Site sampling and evaluation and post-disposal monitoring would be difficult and would be substantially more expensive due to distance from shore and depth of water. In summary, use of an ODMDS off the continental shelf did not offer any environmental advantages over a site located closer to the shore but did involve substantially greater economic disadvantages.

Application of Specific Criteria. Both ODMDS have been evaluated in terms of the following specific criteria.

Geographic Location. Figure 1 indicates the location of the Coquille interim ODMDS and the adjusted ODMDS. Appendix B contains a detailed discussion of the bottom conditions at the ZSF. The interim site lies in 40 to 80 feet of water, 1,250 yards offshore from the entrance to the Coquille River. Corner coordinates are:

43 deg. 07’ 54" N.	124 deg. 27’ 04" W.
43 deg. 07’ 30" N.	124 deg. 26’ 27" W.
43 deg. 07’ 20" N.	124 deg. 26’ 40" W.
and 43 deg. 07’ 44" N.	124 deg. 27’ 17" W.

The disposal site’s center is on a 280 degree azimuth from the river mouth. In general, the interim site lies just north of the submerged extension of Coquille Point on bottom contours sloping at about 60 feet per mile.

The adjusted ODMDS lies 1,500 feet north-northeast of the interim ODMDS. Bottom contours and depths at the adjusted site are similar to those at the interim ODMDS. The adjusted site has the following corner and centroid coordinates:

43 deg. 08’ 26" N.	124 deg. 26’ 44" W.	
43 deg. 08’ 03" N.	124 deg. 26’ 08" W.	
43 deg. 08’ 13" N.	124 deg. 27’ 00" W.	
and 43 deg. 07’ 50" N.	124 deg. 26’ 23" W.	
43 deg. 08’ 08" N.	124 deg. 26’ 34" W.	(centroid)

Distance From Important Living Resources. Aquatic resources of the ZSF are described in detail in appendix A. The interim and adjusted sites are located in the nearshore area, and contain an abundance of aquatic life characteristic of nearshore, sandy, wave-influenced regions common along the coasts of the Pacific Northwest. The dominant commercially and recreationally important macroinvertebrate species in the area are shellfish, Dungeness crab, and squid. Recently, the Oregon Department of Fish and Wildlife (ODFW) has identified a squid spawning area that overlays the adjusted site. Numerous species of birds and marine mammals occur in the pelagic nearshore and shoreline habitats in the ZSF.

The nearshore area off the Coquille River supports a variety of pelagic and demersal fish species. Pelagic species include anadromous salmon, steelhead, cutthroat trout, striped bass, and shad which migrate through the estuary to upriver spawning areas. Although migratory species are present throughout the year, individual species are present only during certain times of the year. Demersal species present include English sole, sanddab, and starry flounder which spawn in the inshore coastal area in the summer. Benthic sampling and composition are discussed in detail in appendix A. The species of invertebrates inhabiting the sandy portions of the ZSF are the more motile psamnitic (sand-dwelling) forms which tolerate or require high sediment flux. Past and anticipated future disposal activities are not expected to significantly effect this community beyond the initial physical impacts of disposal. Abundances of some benthic organisms were higher at the adjusted site than at the interim site.

The interim site contains submerged rocky habitats and is immediately adjacent to the neritic reefs described in detail in appendix A. These are unusual features along the coast and support a variety of aquatic organisms, including bull kelp (Nerocystis lutkeana) and its associated fish and invertebrate community. Pelagic species associated with the neritic reefs to the east and south of the estuary and jetties include both resident and non-resident species. The shallower reefs are dominated by black rockfish while the deeper reefs are dominated by lingcod, yellow rockfish and black rockfish. These rocky areas also have a very different benthic composition from the surrounding, sandy environments. Past disposal activity does not appear to have significantly impacted this community.

The ocean waters contain many nearshore pelagic organisms which include zooplankton and meroplankton (fish, crab and other invertebrate larvae). These organisms generally display seasonal changes in abundance and, since they are present over most of the coast, are not critical to overall coastal populations. Based on evidence from previous zooplankton and larval fish studies, no impacts to organisms in the water column are predicted (Sullivan & Hancock, 1978).

Portland District requested an endangered species listing for the ZSF from U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). The brown pelican and the gray whale represent the only species which were listed. Based on previous biological assessments conducted along the Oregon coast regarding impacts to the brown pelican and the gray whale, no impact to either species is anticipated from the project. Letters of concurrence are included in appendix F, Comments and Coordination.

In summary, both the interim and adjusted ODMDS contain living resources that could be affected by disposal activities. Evaluation of past disposal activities do not indicate that unacceptable adverse effects to these resources have occurred. The interim site contains and is in close proximity to submerged rocks and reefs with rich and varied aquatic communities. There is no evidence that past disposal has seriously impacted these communities, and in the absence of any other disposal location the interim site should be considered an acceptable site. However, the adjusted site represents a potentially less impacting location and its use is considered environmentally preferable.

Distance From Beaches and Other Amenities. The southeast corner of the proposed site is approximately 1,250 yards from the end of the north jetty. Both the interim and adjusted ODMDS are far enough removed that use of either site would not affect these amenities.

Types and Quantities of Material to be Deposited at the Site. The final designated ODMDS will receive dredged materials transported by either government or private contractor hopper dredges. The current dredges available for use at Coquille have hopper capacities from 800 to 4,000 cy. This would be the range in volumes of dredged material disposed of in any one dredging/disposal cycle. Upwards of 100,000 cy of material can be placed at the site in one dredging season by any combination of private and government dredgers. The dredges would be under power and moving while disposing. This allows the ship to maintain steerage.

The material dredged from the entrance channel consists of medium to fine grain marine sands. The dredged material shows a wider variation in median grain size and tends to be slightly coarser than the ambient sediments at the proposed disposal site. The differences are small enough that the sediments are considered compatible. The occasional gravel sized sediments occur in such small quantities and so infrequently as to cause no problems. Appendices B and C provide grain size information for the disposal area and the dredged area. All sediments destined for ocean disposal is subject to specific evaluation, including independent review by EPA. Past sediments discharged at the interim ODMDS have been clean sands that met the exclusion criteria (40 CFR 227.13(b)).

Feasibility of Surveillance and Monitoring. The proximity of the interim disposal site to shore facilities creates an ideal situation for shore-based monitoring of disposal activities to ensure that material is actually discharged at the disposal site. There is routinely a Coast Guard vessel patrolling the entrance and nearshore areas so surveillance can also be accomplished by surface vessel.

Following formal designation of an ODMDS for Coquille, EPA and the Corps will develop a site management plan which will address the need for post-disposal monitoring. Several research groups are available in the area to perform any required field monitoring. The work could be performed from small surface research vessels at a reasonable cost.

Dispersal, Horizontal Transport, and Vertical Mixing Characteristics of the Area. The nearshore circulation at Coquille is influenced by the complex bathymetry and geology. Bottom currents have been observed by video camera and were recorded in April-May 1985. Currents were toward the north and offshore with velocity under .5 feet/second. The area at Coquille is exposed to normal wave action as described in appendix B. The material dredged from the entrance channel at Coquille River is fine to medium sand. For the range of depths and grain sizes found at either of the Coquille ODMDS sites there is essentially constant mobility of bottom sediment due to wave action. This wave-induced motion is not responsible for net transport, but, once in motion, bottom sediments can be affected by other forces such as gravity or directional currents. Sediments discharged at either of the ODMDS would be expected to join the littoral movement and disperse gradually out of the site.

Effects of Previous Disposal. Appendix B, table B-1, gives volumes of material disposed of over the last 10 years. The 10 year range of disposal has varied from 25,000 to 116,000 cy; on average, about 59,000 cy are annually discharged to the ocean. Future volumes are expected to be similar, although probably showing some increase as other disposal options are exhausted.

No biological information has been found to exist regarding the interim site prior to any disposal having occurred. It is expected that no significant impacts to the interim site have occurred beyond the yearly, site-specific effects of disposal. Beyond the observation that abundances of some benthic organisms are lower inside the interim ODMDS than other locations outside (which may be related to past disposal), there appear to be no apparent disposal effects.

No pre- or post-disposal studies on water or sediment quality have been performed. Sediments disposed in the past are identical to sediments collected in close proximity to the interim site (appendix B) and have met the exclusion criteria for testing.

Interference With Other Uses of the Ocean.

Commercial Fishing: Two commercial fisheries occur in the inshore area: salmon trawling and Dungeness crab fishing (appendix A). The length of the salmon fishing season varies each year depending upon the established quota; however, it normally extends from July to September. During this period, the potential exists for conflicts between the dredge and fishing boats. The Coast Guard and ODFW indicated that this had never been a problem to their knowledge. The Dungeness crab season extends from December 1 to August 15 each year; however, most of the crabbing occurs prior to June and usually ends early because of the increase in soft shell crabs in the catch which are not marketable. As a result, most crab fishing is done outside of the normal dredging season and it is unlikely that a conflict would result. ODFW has identified a potential squid fishery in the area. No fishery exists at present, but stocks may be sufficient to support a fishery if a market develops. There are no commercial fish or shellfish aquaculture operations that would currently be impacted by use of the existing disposal site.

Recreational Fishing: Both private party and charterboat recreational fishing for salmon and rock and reef fish occurs in the inshore area off Coquille River. The sports salmon fishing season coincides with the commercial season and extends from summer until the quota for the area is reached. Most of the sports fishery occurs along the south reef because of navigational hazards on the north reef. Potential exists for recreational fishing boats to conflict with dredging and disposal operations; however, none has been reported to date. It is unlikely that any significant conflict will develop in the near future (U.S. Coast Guard, personal communication).

Offshore Mining Operations: No offshore mining presently occurs; although, considerations for offshore mining and oil/gas leases are in the development stages. The disposal site is not expected to interfere with such proposed operations, as most exploration programs are scheduled for the outer continental shelf.

Navigation: No conflicts with commercial navigation traffic have been recorded in the more than 60-year history of hopper dredging activity. The probable reason for this is the light commercial traffic through the Coquille navigation channel. Interviews with Coast Guard personnel also did not produce any instances of conflicts with either commercial or recreational traffic. Navigation hazards exist within the ZSF (e.g., rock outcroppings/reefs) which have been considered in positioning the adjusted ODMDS. Ships cannot navigate within the area south of the interim disposal site.

Scientific: There are no identified scientific study locations within the ZSF. However, there is a permanent wave buoy several miles offshore in 70 meter water depth. This buoy is part of a Pacific Coast wave data network operated by Scripps for the Corps of Engineers.

Coastal Zone Management: In reviewing proposed ODMDS for consistency with the Coastal Zone Management (CZM) plan, they are evaluated against Oregon's Statewide Goal 19 (Ocean Resources). Local jurisdiction does not extend beyond the baseline for territorial seas and, therefore, local plans do not address offshore sites. Goal 19 requires that agencies determine the impact of proposed projects or actions. Paragraph 2.g of Goal 19 specifically addresses dredged material disposal. It states that agencies shall "provide for suitable sites and practices for the open sea discharge of dredged material which do not substantially interfere with or detract from the use of the continental shelf for fishing, navigation, or recreation, or from the long-term protection of renewable resources." Decisions to take an action, such as designating an ocean disposal site, are to be preceded by an inventory and based on sound information and on an understanding of the resources and potential impacts. In addition, there should be a contingency plan and emergency procedures to be followed in the event that the operation results in conditions which threaten to damage the environment.

Ocean disposal sites for dredged material are designated following guidelines prepared by the EPA (Ocean Dumping Regulations). Site selection is to be based on studies and an evaluation of the potential impacts (40 CFR Part 228.4(e)). This meets the requirements of State Goal 19 for decisions to be based on inventory and a sound understanding of impacts. The five general and eleven specific criteria for the designation of a site presented in 40 CFR Parts 228.5 and 228.6 outline the type of studies to be conducted and the resources to be considered. According to 40 CFR Part 228.5(a), ocean disposal will only be allowed at sites "selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation." Monitoring is to be conducted at ocean disposal sites; and if adverse effects are observed, use of the site may be modified or terminated. The requirements of the ocean dumping regulations are broad enough to meet the needs of Goal 19. Therefore, the designation of this site for ocean disposal of dredged material following the ocean dumping regulations would be consistent with Goal 19 and the State of Oregon's Coastal Zone Management Plan.

Existing Water Quality and Ecology. Water quality off the mouth of the Coquille River is considered excellent, typical of unpolluted seawater along the Pacific Northwest coast. No short or long term impacts on water quality are expected to be associated with disposal operations. The ecology of the area is presented in appendix A. The offshore area is a northwest Pacific mobile sand community bordered by a neritic reef system. Evaluation of the interim ODMDS in light of past disposal did not indicate any significant adverse effects to those communities. Designation and use of the adjusted ODMDS is not expected to have significant ecological consequences and provides additional distance from the reef community.

Potential for Recruitment of Nuisance Species. It is highly unlikely that any nuisance species could be transported or attracted to the disposal site as result of dredging and disposal activities.

Existence of Significant Natural or Cultural Features. The neritic reefs off the Oregon coast comprise a unique ecological feature. They support a wide variety of invertebrates and fish species as well as bull kelp communities. These areas are partially sheltered from wave action and receive nutrients from both the ocean and the estuaries are usually highly productive.

Potential areas of shipwrecks are shown in appendix D. Given the characteristics of the Coquille Bar, onshore current patterns, and hard sand bottom, and the fact that the ship channel over the bar has been actively maintained by dredging and removal of wrecks from the 1860's to present, it is unlikely that any wrecks have survived in the vicinity of the disposal site. Based on this information it is unlikely that any significant cultural resources will be affected by the continued use of the disposal site. Appendix E with supplementary side scan sonar data was reviewed by the State Historic Preservation Office (SHPO). SHPO concurred with the Corps' findings of no cultural resources concerns. The SHPO letter of concurrence is included in appendix F.

Selection of Preferred Alternative. Based upon the information contained in this EIS, designation of an ODMDS off the Coquille River, Oregon, is considered necessary. After applying the five general and eleven specific criteria to the available options, designation of the adjusted ODMDS was selected as the preferred alternative. Continued use of the interim ODMDS would not be expected to cause **unacceptably** adverse environmental effects. The interim disposal site encompasses large areas of exposed rock and scattered rock outcrops as well as areas covered by fine sand. The extent of rock exposures and proximity to reef shoals presents both a hazard to the hopper dredges and potential for some adverse environmental impacts. The adjusted site does not have these concerns and is therefore considered the better site.

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IV. AFFECTED ENVIRONMENT

General. A brief summary of existing conditions within the ZSF or specifically at the interim or ODMDS is presented below and is the basis for evaluating the suitability of the sites for ocean disposal. More detailed information on the affected environment is presented in the appendices which were reproduced from the Corps' Site Evaluation Report. Information regarding the nature and frequency of the sediments dredged from the Coquille navigation channel entrance is also provided.

Physical Environment.

General. The topography of the seafloor offshore in the ZSF is varied and complex. To the north of the Coquille's mouth the bed slopes evenly at 1.1/1000 from a depth of 24 to 84 feet. South of the mouth a line of islets, skerries and submerged rock pinnacles runs in a southeast-northwest direction. Below 84 feet, there is a rocky reef with an irregular surface featuring both hollows and high points. No evidence of mounding from previously disposed dredged material was found in a July, 1985 survey (appendix B).

The interim ODMDS encompasses large areas of exposed rock and scattered rock outcrops, as well as areas covered by fine sand. Depths vary between 42 and 84 feet. Because of the extent of rock exposures which constitute a navigation hazard for the hopper dredges, it was concluded that a different location for the disposal site should be found. A potential site (the adjusted ODMDS) was identified and defined that lies 1,500 feet north-northwest of the interim site. The sediment at the adjusted ODMDS is primarily fine sand with small amounts of medium and coarse sand, and includes minor quantities of fines. Depths at the proposed site also range between 42 and 84 feet.

The sediments dredged from the entrance of Coquille are fine marine sands identical to existing nearshore sediments. Under winter wave conditions common to this part of the Pacific Coast, these fine sands are highly mobile to a depth of 90-120 feet. Summer wave conditions commonly mobilize sands to a depth of 40-60 feet. While waves are responsible for resuspending bottom sediment, including dredged material, it is the long-term mean current that determines the extent and direction of dispersal. The dredged material from the Coquille entrance channel shows a wider variation in median grain size and tends to be slightly coarser than the ambient sediments at either the interim or adjusted ODMDS. The differences are small enough that the sediments are considered compatible. Occasional gravel-sized sediments occur in small quantities and so infrequently as to cause no problems at the disposal sites.

Despite the slight difference in size between offshore sediments and dredged material, samples taken inside the interim disposal site are indistinguishable from those taken outside the site. The most recent bathymetric surveys by the Corps have shown no mounding in the interim ODMDS. Disposal activities have had no noticeable impact on either the bottom sediment or bathymetry.

Littoral transport mechanisms have competence and capacity to move all of the material.

Geology. There are zones of heavy mineral concentrations in black sand deposits offshore of the mouth of the Coquille River, but they are located several miles to the northwest of the disposal area. A deposit of gravel that also contains concentrations of gold lies several miles southwest of the disposal area. While these deposits have commercial potential, they all lie outside the ZSF. Oil and gas exploration is concentrated on the outer shelf. Thus far, only traces of oil and gas have been found in wells drilled off the Oregon coast.

Circulation and Currents. The nearshore mean circulation is alongshore, closely paralleling the bathymetric contours, with a lesser onshore-offshore component. Circulation patterns are variable with season and weather conditions. In winter the general shelf circulation is to the north although short periods of southerly flow occur. Coos Bay studies suggest that offshore flow along the Oregon Coast is more common in the winter. This would indicate a tendency for sediment in the ZSF to move north and west under winter circulation conditions. During the remainder of the year, flow is southerly with lower current velocities than in winter. Periodic changes in summer wind direction cause episodes of upwelling in which offshore near-shore water transport causes a compensating near-bottom onshore flow. These upwelling events continue for several days at a time, and occur between April and July. Near-bottom flow during summer should be generally southerly with onshore/offshore flow varying due to local wind conditions. Sediment movement would vary with these circulation patterns.

Water and Sediment Quality. Water and sediment quality throughout the ZSF is expected to be typical for seawater of the Pacific Northwest. There is no reason to expect significant chemical contamination as few heavy industries are located along the estuary. There is commercial fishing, fish processing, and three lumber mills--including the Moore Mill at RM 1.3. These mills have been operating intermittently during the last several years and they do not seem to have increased the organic load, as measured by the volatile solids (appendix C). No specific sediment or water quality analyses at Coquille have been done. Limited analyses have been performed at other estuarine locations in Oregon which show very low levels of contaminants of concern (USGS 1983 and Felstul 1988).

Biological Environment.

General. Aquatic resources of the ZSF are described in detail in appendix A. Both ODMDS sites are located in the nearshore area and the overlying waters contain many nearshore pelagic organisms. The interim site is also adjacent to the neritic reefs which are described in detail in appendix A. These reefs are unusual features along the coast and support a variety of aquatic organisms. Bull kelp and its associated fish and invertebrate community are also associated with the neritic reefs.

Benthic. Based on the analysis of benthic samples collected at and to the north and south of the Coquille interim ODMDS, the benthic faunal communities throughout most of the ZSF are characteristic of nearshore, sandy, wave-influenced regions common along the Pacific Northwest coast. The adjusted ODMDS, between 40 and 70 feet deep, had a high abundance of polychaete worms and gammarid amphipods. Lower abundances of these groups were present at the interim site. The invertebrates inhabiting the sandy portions of the ZSF are the more motile, sand-dwelling forms which tolerate or require high sediment flux. They are typical of other shallow water disposal sites such as Coos Bay sites E and F (Hancock et al. 1981). The rocky areas (skerries, islets, pinnacles, etc.) within the ZSF have a very different species composition and greater diversity. The infaunal community consists of over 131 species, many of which are encrusting forms or those generally associated with coarse shell, rocks and larger grained sediments.

The dominant commercially and recreationally important macroinvertebrate species in the inshore coastal area are shellfish, Dungeness crabs and squid. The Oregon Department of Fish and Wildlife (ODFW) has begun studying squid resources, and a spawning area offshore from the disposal site has recently been identified.

Fishes. The nearshore area off the Coquille River supports a variety of pelagic and demersal fish species. Pelagic species include anadromous salmon, steelhead, cutthroat trout, striped bass and shad that migrate through the spawning areas. Other pelagic species include the Pacific herring, anchovy, surf smelt, and sea perch. Surf smelt in particular occur in nearshore areas in the estuary in large numbers during the summer.
77. Although migratory species are present throughout the year, individual species are only present during certain times of the year.

Demersal species present in the inshore area include a number of flatfish, which occur primarily over the sandflats. English sole, sanddab, and starry flounder spawn in the inshore coastal area in the summer and juveniles of these as well as other marine species rear in the estuary.

Pelagic species that are associated with the neritic reefs to the west and south of the estuary and jetties include both resident and non-resident species. The shallower reefs are dominated by black rockfish while the deeper reefs are dominated by lingcod, yellow rockfish and black rockfish.

Wildlife. Numerous species of birds and marine mammals occur in the pelagic, nearshore, and shoreline habitats throughout the ZSF. Principle species found offshore are Leach's storm petrel, Brandt's cormorant, pelagic cormorant, western gull, glaucous-winged gull, common murre, and harbor seal. Either disposal site would comprise a portion of the foraging area for these species. Nesting by pelagic and Brandt's cormorants, common murres, and glaucous-winged and western gulls occurs on nearby offshore rocks. The presence of nearby foraging sites is an important parameter in the nesting success of these species. Harbor seals also haul out and pup on these offshore rocks.

Endangered Species. Portland District requested an endangered species listing for the site from U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). The brown pelican and the gray whale were the only species listed. Based on previous biological assessments conducted along the Oregon coast regarding impacts to the brown pelican and the gray whale, no impact to the species was anticipated from continued dredging and ocean disposal operations. Letters of concurrence are included in appendix F, Comments and Coordination.

Socio-Economic Environment.

General. The Coquille River enters the Pacific Ocean at the city of Bandon in Coos County, Oregon and navigation on the river is critical to the local economy. The city of Bandon has a population of 2,270 with an additional 2,000 people within the city's market area. Coos County has a population of 61,000 (USCE, March, 1987). The area has been suffering from a chronically depressed economy in recent years.

Natural Resource Harvesting (Commercial). Forest products in the form of standard and specialty cuts of lumber have traditionally been the largest component of the local economy. Commercial fishing is the second largest industry in Coos County. Both of these sectors rely to some extent on the Coquille River navigation channel.

Large offshore deposits of black sands have been identified a few miles to the northwest of the Coquille River mouth, but none within the ZSF. This deposit was found to have a black sand concentration of between 10 to 30 percent. Minerals of primary interest in black sands are gold, platinum, and chromite, but the sands also contain numerous other heavy minerals. The offshore deposits found near the Coquille River are not currently being mined, but sites are being considered for exploration.

A large gravel deposit is located to the southwest of the ZSF. Included within the deposit is a gold anomaly zone with a concentration of over 0.005 parts per million (ppm) gold. The gravels are being considered as a potential future source of aggregate for urban areas in California. The gold could conceivably add to the attractiveness of the deposits by compensating for some of the dredging costs. While there have been several attempt to find oil and gas along the Oregon coast, no test well has produced more than traces of oil and gas. The offshore well nearest to the mouth of the Coquille River was about 12 miles to the northwest, at which nothing more than traces of gas was found. Wells just a few miles inland from the mouth were no more productive.

Recreation. Sport fishing and recreational boating occur and the Bandon community has made a concerted effort to develop a stronger tourist trade in an attempt to diversify the local economy (USCE, March, 1987). The area around the mouth of the Coquille River receives recreational use year-round with the most popular months being from May through September. Primary activities include fishing, camping, beachcombing, sightseeing and picnicking. Bullards Beach State Park extends north along the coast for several miles from the north jetty. Another state park, the Bandon Ocean Wayside, is located along the coast approximately one mile south of the Bandon city center.

The Coquille River jetties are popular for fishing. Fishing pressure is heaviest from June through August when surf conditions are less threatening and unpredictable than in winter. The offshore fishery is primarily rockfish and salmon. The most popular and productive area is offshore of Coquille Point to the south of the river. Also see appendix D.

Cultural Resources. Research and analyses of the relevant historical records and the preservation context (suitability of the existing environmental conditions for preserving cultural resources) indicate that the most likely cultural resources within the project area are shipwrecks. Wrecks in the study area tend to occur in surf zones or on beaches. They are not likely to be found in the proposed disposal site. It is also highly unlikely that any evidence of prehistoric sites would be present in the offshore sites, based upon the environmental conditions found in the area. Additional information is provided in appendix E.

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V. ENVIRONMENTAL CONSEQUENCES

General. The proposed action is the designation of a site to be available for ocean disposal of dredged material. Designation of the site itself is an administrative action that would not have any direct environmental effects; however, it would subject the site to use as an ocean disposal area. Although no significant impacts are predicted by this designation action, EPA has voluntarily committed to preparing and circulating EISs as part of the designation process. This EIS addresses the likely effects of disposal at either the interim or the adjusted ODMDS based upon the Corps' current O&M dredging program for the Coquille River navigation project. A separate evaluation of the suitability of dredged material and disposal impacts will be conducted for each proposed disposal action by the Corps as required under Section 103 of the MPRSA. EPA independently reviews all proposed ocean disposal of dredged material.

Physical Effects. Disposal of dredged material from the Coquille River entrance channel at either the interim or adjusted ODMDS would not have a significant effect on the physical environment. The material consists of clean sand which is slightly coarser than that present at the disposal sites but is still compatible for disposal on the sandy bottom. At the interim ODMDS, some rocky bottom habitat might be buried by disposal of sand on it. The dredged material would disperse from the site in the littoral drift system with movement expected to be to the north and offshore during the winter and lesser movement to the south in summer. No mounding is expected to occur. The physical placement of dredged material would be expected to have short-term effects on the rocky habitats. These effects would be more severe than those that would occur if the material was placed on sandy areas; however, they are not judged to be significant.

The material dredged from the river entrance channel consists of clean sand. It is not expected to contain significant levels of contaminants of concern and would meet the exclusion criteria in 40 CFR 227.13(b). Disposal of this material would not introduce contaminants to the sediments at the disposal site or degrade water quality. Short term turbidity effects are anticipated. A separate evaluation of the suitability of dredged material and disposal impacts will be conducted for each proposed disposal action by the Corps as required under Section 103 of the MPRSA. EPA will independently review all proposed ocean disposal of dredged material.

No mineral resources are expected to be affected by disposal at either ODMDS.

Biological Effects. The interim and adjusted ODMDS are located in the nearshore area, and contain an abundance of aquatic life characteristic of nearshore, sandy, wave-influenced regions common along the coasts of the Pacific Northwest. These include zooplankton such as copepods, euphausiids, and meroplankton (fish, crab and other invertebrate larvae). These organisms generally display seasonal changes in abundance and are present over most of the coast. Based on evidence from various zooplankton and larval fish studies, it appears that there will not be any impacts to organisms in the water column (Sullivan and Hancock, 1977). Impacts to the biological environment would be primarily to the benthic community. Some mortality would occur as a result of smothering. Most of the benthic species present are motile and adapted to a high energy environment with shifting sands. Therefore, many would likely survive the effects of disposal. In addition, some recolonization would occur from surrounding areas since the sediments would be compatible. The rate of recolonization would be affected by disposal frequency. Impacts could be greater in the rocky portion of the interim site where more species are found and many of them are sessile or encrusting forms which are more susceptible to smothering. Although significant adverse impacts are not predicted for use of either the interim or adjusted ODMDS, use of the adjusted ODMDS would result in less environmental impact.

Larger, more motile organisms such as fish, birds and marine mammal species would likely avoid the disposal activity or move out once it is begun. They would likely be exposed to short term turbidity at most. Therefore, impacts are expected to be limited to disturbance rather than injury or mortality.

The brown pelican and the gray whale are the only endangered species indicated by the USFWS and NMFS as likely to occur in the project area. Based on previous biological assessments regarding impacts to these species along the Oregon coast, no impact to either species is anticipated from the designation or use of the ocean disposal sites.

Socio-Economic Effects. The designation of an ocean disposal site for dredged material off the mouth of the Coquille River would allow the continued maintenance and possible improvement of the navigation channel. This would result in waterborne commerce remaining an important component of the local economy. If a site is not designated, maintenance dredging may ultimately cease for lack of adequate disposal sites or other, potentially more environmentally sensitive habitats (e.g., wetlands), would be used. If maintenance dredging of the channel ceases, the channel would shoal in and become unsafe or unusable. Shipping and fishing traffic would have to be directed through other ports and the local economy would suffer.

No known mineral or economic resources would be impacted by disposal at the interim or adjusted ODMDS.

The interim and adjusted ODMDS are located outside of any major recreational use areas. As a result, few impacts to recreation are expected to occur. Time delays for recreational boaters caused by the passing of the dredge or an increase in navigation hazards during congested periods could occur. Conflicts such as these can be considered an inconvenience rather than a threat to recreational activity. Collisions between recreational boaters and dredge traffic are unlikely due to the slow speed at which the dredge moves.

There would be a short-term reduction in aesthetics at either disposal site as a result of turbidity following disposal. The material would settle rapidly and not affect any areas outside of the disposal area. No impacts would occur on the beach or adjacent recreation areas. Recreational considerations are fully discussed in appendix D.

It is unlikely that any cultural resources are present in either ODMDS. Designation or use is not expected to have any impact on cultural resources.

Coastal Zone Management. The Coquille Estuary Management Plan and Coos County Comprehensive Plan have been approved and acknowledged by the State of Oregon. Both of these plans contain discussions of ocean disposal and recognize the need to provide for suitable offshore sites for disposal of dredged materials. No significant effects on ocean, estuarine, or shoreland resources are anticipated, as goal 19 of Oregon's Statewide Planning Goals and Guidelines require.

The proposed action was determined by the Corps to be consistent with the acknowledged local comprehensive plans and the State of Oregon Coastal Management Program. The State of Oregon reviewed the Corps' consistency determination in the Site Evaluation Report. Their letter is located in appendix F, Comments and Coordination.

Unavoidable Adverse Impacts. Designation of an ODMDS would allow continued dredging and disposal of dredged material from the Coquille River entrance channel with attendant effects.

Relationship Between Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity. Disposal of dredged material at the adjusted ODMDS would have a unquantifiable, but apparently minor short- and long-term effect of the productivity of the ocean environment. Use of the ODMDS would have a long-term beneficial effect on the economy of the city of Bandon and Coos County.

Irreversible and Irretrievable Commitments of Resources. Permanent designation of the adjusted ODMDS for disposal would commit the site and its resources primarily to that use. Other uses such as oil and gas explorations, and to varying degrees, mining, fishing, and use by certain aquatic species, would be constrained or precluded.

VI. COORDINATION

Coordination By the Corps of Engineers. Procedures used in the evaluation and the proposed adjustment of the ODMDS site were discussed with the following State and Federal agencies by the Portland District, Corps of Engineers, to support their site designation studies and preparation of their Site Evaluation Report:

- U.S. Coast Guard
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. National Marine Fisheries Service
- Oregon Department of Fish and Wildlife
- Oregon Department of Environmental Quality
- Oregon Division of State Lands

These agencies were briefed on the proposed technique from the task force workbook and existing information was requested of them. Copies of the draft Site Evaluation Report were provided to them by the Corps and their comments on the draft were formally requested. Letters received are included in appendix F.

Agency statements of concurrence or consistency are required for three Federal laws. The statutes and responsible agencies are:

Endangered Species Act of 1973, as amended -- U.S. Fish & Wildlife Service, National Marine Fisheries Service

National Historical Preservation Act of 1966, as amended -- Oregon State Historic Preservation Officer

Coastal Zone Management Act of 1972, as amended -- Oregon Department of Land Conservation and Development

Consistency or preliminary concurrence letters from the above agencies received as result of the Corps' report coordination are included in appendix F. State water quality certifications, as required by Section 401 of the Clean Water Act, will be obtained for individual dredging actions as part of the normal permitting or Federal project approval process.

Coordination By EPA. Coordination with the Portland District was maintained throughout the site designation studies and during preparation of their Site Evaluation Report. A copy of that report was reviewed by EPA. EPA has voluntarily committed to prepare and circulate EISs for site designation actions. A Notice of Intent to Prepare an Environmental Impact Statement on the final designation of an adjusted ODMDS site off Coquille River, Oregon, was published in the **Federal Register** on Friday, January 8, 1988. The Site Evaluation Report submitted to Region 10, EPA, by the Corps was used as the basis for preparation of this draft EIS. A formal 45-day public review period will allow comments to be received from all State and local agencies, and private groups and individuals on this proposed designation by EPA. A list of those who received the draft EIS for comment may be requested. Many of the same agencies that reviewed the Corps' Site Evaluation Report received the draft EIS.

As a separate but concurrent action, EPA published a proposed rule in the **Federal Register** for formal designation of the adjusted Coquille ODMDS. Both the notice of availability of the draft EIS and the proposed rule appeared November 10, 1988 so that the 45-day public review period for the draft rule overlapped with the public review period for the draft EIS.

Comments on the Draft EIS. Six letters were received on the draft EIS and proposed rule. The letters of comment and response by EPA are contained in Appendix G of this EIS.

VII. LIST OF PREPARERS

Disposal site studies were designed and conducted by the Corps, in consultation with EPA, and a Site Evaluation Report was prepared by the Portland District, Corps of Engineers. That document was submitted to EPA for review and processing for formal designation by the Regional Administrator, Region 10. The Corps' Site Evaluation Report was used by EPA as the basis of the draft and final EIS. The technical appendices from the Site Evaluation Report are reproduced as appendices to the EIS.

Preparation of draft and final EIS:

U.S. Environmental Protection Agency:

John Malek	Ocean Dumping Coordinator and Project Officer
Linda Storm	Environmental Protection Specialist

Preparation of Site Evaluation Report and Technical Appendices:

U.S. Army Corps of Engineers, Portland District:

Michael F. Kidby	P.E. Civil Engineer
A. Rudder Turner, Jr.	Oceanographer
David R. Felstul	Environmental Specialist
Danil R. Hancock	Oceanographer (IPA: Oregon State U.)
Stephan A. Chesser	Geological Oceanographer
Kim Larson	Fishery Biologist
Geoff Dorsey	Wildlife Biologist
William B. Fletcher	Hydrologist
Ted O. Fischer	Civil Engineering Tech

The following contractors prepared reports or provided input to the Site Evaluation Report:

1. Earth Sciences Associates (sidescan sonar / subbottom profiling)
2. Geo Recon International (sidescan sonar / subbottom profiling)
3. Howard R. Jones, Marine Taxonomic Consultants (benthic macrofauna analysis)
4. Dr. Charles Sollitt, Dept of Civil Engineering, Oregon State U. (physical oceanography--current meter work)
5. North Pacific Division Materials Lab [A.C.E.] (sediment analysis)

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APPENDIX A

LIVING RESOURCES

APPENDIX A

LIVING RESOURCES

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APPENDIX A

LIVING RESOURCES

Introduction

1.01 Information on marine benthic resources was obtained from a field sampling program conducted in June 1985. There was also a thorough utilization of a variety of published and unpublished reports, theses, and personal communications with the ODFW Marine Resources Division biologists. Critical resources were determined primarily by whether the resource was unique to the area or was in limited abundance along the Oregon coast.

Plankton and Fish Larvae

1.02 Distribution and abundance of inshore plankton species vary depending upon nearshore oceanographic conditions. In the summer when the wind is predominantly from the northwest, surface water is moving south and away from the shore. Colder, more saline, nutrient-rich water then moves up from the depths onto the shore. This upwelling phenomenon can extend up to 10 km offshore and last from days to weeks depending upon the strength and duration of the wind. Zooplankton taxa during this time are predominantly those from subarctic water masses.

1.03 In the winter the wind is primarily out of the west and southwest, and surface waters are transported inshore. The zooplankton community during this time of the year consists of species from the transitional or Central Pacific water masses.

1.04 No specific data is available for the area offshore from the Coquille River. However, Peterson and Miller (1976), and Peterson et al. (1979), have sampled the zooplankton community off Yaquina River and found copepods to be the dominant taxa. The species present varied with season. Of the 58 total species collected, 38 were collected in the summer and 51 in the winter. Eight occurred commonly in both summer and winter while seven occurred only or predominantly in the summer and six in the winter. A list of dominant summer and winter species is given below (table A-1). In general, winter species are less abundant than summer species.

1.05 Other taxa collected were of minor importance as compared with the copepod abundance except for a few organisms during parts of the year. (A list of the other taxa collected is given in tables A-2 and A-3).

1.06 The other plankton species of importance is the megalops larval stage of the Dungeness crab (*Cancer magister*). Lough (1976) has reported that megalops occur inshore from January to May and are apparently retained there by the strong longshore and onshore components of the surface currents in the winter. After May, the megalops metamorphose into juvenile crabs and settle out of the plankton, moving into rearing areas in the estuary.

Table A-1

Dominant Copepod Species by Season in Decreasing Order of Abundance

Winter Species	Summer Species
Pseudocalanus sp.	*Pseudocalanus* sp.
Oithona similis	*Acartia clausii*
Paracalanus parvus	*Acartia longiremis*
Acartia longiremis	*Calanus marshallae*
	Centrophages abdominalis
	Oithona similis

1.07 Fish larvae are a transient member of the inshore coastal plankton community. Their abundance and distribution have been described by Richardson (1973), Richardson and Pearcy (1977), and Richardson et al. (1980).

1.08 Three species assemblages have been described off the Oregon coast: coastal, transitional, and offshore. In general, the species in the coastal and offshore assemblages never overlap while the transitional species overlapped both groups. The break between the coastal and transitional groups occurs at the continental slope.

1.09 The coastal group is dominated by smelt (Osmeridae) which made up over 50 percent of the larvae collected. Other dominant species include the English sole (Parophrys vetulus), sanddab (Citharichthys sordidus), starry flounder (Platichthys stellatus), and tom cod (Microgadus proximus). Maximum abundance occurs from February to July when greater than 90 percent of the larvae were collected. Two peaks of abundance are present during this period; one in February and March (24 percent of larvae) and one in May to July (68 percent of larvae) following upwelling. Dominant species during each peak are shown below (table A-2).

1.10 The results of the studies off Yaquina Bay indicate that the larval species present in the inshore coastal areas were similar and had the same peaks of abundance as those collected in Yaquina River; however, the dominant species differed. In Yaquina Bay, two species accounted for 90 percent of the species collected, the bay goby (Lepidogobius lepidus) and the Pacific herring (Clupea harengus pallasi). Neither were present in the inshore coastal area. Starry flounder spawn in the area to the north of the estuary and the juveniles use the estuary as juvenile rearing areas. English sole probably use the estuary as a rearing area. Because oceanographic conditions are similiar over much of the Central Oregon coast, it is likely that zooplankton and larval population dynamics are similar between Coquille and Yaquina ocean disposal areas.

Table A-2

Dominant Fish Larval Species During the Two Peaks of Abundance

Species	February to March	May to July
Smelt (Osmeridae)	1.51*	4.12
English sole (Parophrys vetulus)	4.09	
Sandlance (Ammodytes hexapterus)	1.76	
Sanddab (Citharichthys sordidus)	1.73	2.21
Tom cod (Microgadus proximus)		2.03
Slender sole (Lyopsetta exilis)		1.07

* Biological index--Ranking method that averages abundance and frequency of occurrence in samples. 5 to 1 in decreasing order.

Benthic Invertebrates

1.11 Benthic invertebrates play an important role in secondary productivity in nearshore marine systems. They are not only a direct source of food for many demersal fishes but play an active part in the shredding and breakdown of organic material and in sediment reworking.

1.12 Knowledge of the nearshore benthic communities off the central Oregon coast is scant. A literature review conducted by Portland District indicated that only six quantitative benthic studies have been conducted in nearshore coastal waters off Oregon.

1.13 Investigations include evaluating offshore disposal sites near the mouth of the Columbia River by Richardson et al. (1977), a quantitative study of the meiobenthos north of Yaquina River (Hogue 1981) and an outfall study for the International Paper Company's outfall near Gardiner, Oregon (Unpublished, n.d.). In addition, site specific studies of ocean disposal for the selection of the Coos Bay (Hancock et al. 1981, Nelson et al. 1983 and Sollitt et al., 1984) and Yaquina Bay ODMDS have been completed (USACE 1985 and 1986). These studies comprise the total benthic infaunal data base available for the Oregon coast. All but one of these benthic studies were sponsored by Portland District.

1.14 To provide site-specific benthic information to supplement these data and characterize the Coquille interim disposal site, Portland District collected and analyzed benthic samples as described below.

1.15 Stations were located on the 40-, 50-, 60-, 70- and 80-foot depth contours along the centerline of the interim disposal site and also along transects north and south of the disposal site as shown in figure A-1. Six replicate bottom samples were taken from 12 of the 15 stations using a modified Gray-O'Hara box corer which sampled a .096m area of the bottom. Submerged rock outcrops prevented sampling at stations Q-3-4 and Q-3-5.

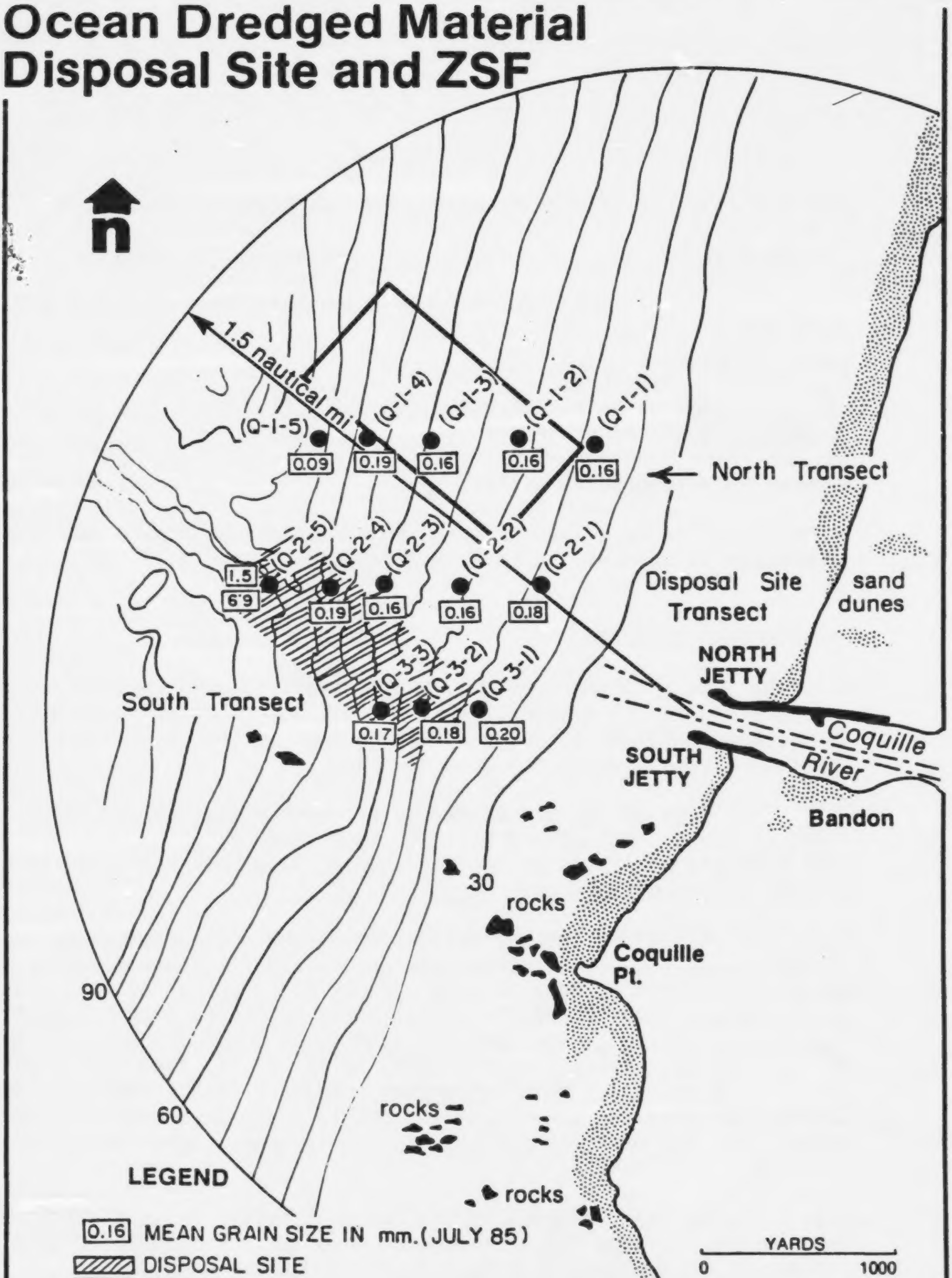

Ocean Dredged Material Disposal Site and ZSF
n
1.5 nautical mi
(Q-1-5)
(Q-1-4)
(Q-1-3)
(Q-1-2)
(Q-1-1)
0.09
0.19
0.16
0.16
0.16
North Transect
(Q-2-5)
(Q-2-4)
(Q-2-3)
(Q-2-2)
(Q-2-1)
1.5
6.9
0.19
0.16
0.16
0.18
Disposal Site Transect
sand dunes
NORTH JETTY
South Transect
(Q-3-3)
(Q-3-2)
(Q-3-1)
0.17
0.18
0.20
SOUTH JETTY
Coquille River
Bandon
30
rocks
Coquille Pt.
90
60
rocks
rocks
LEGEND
0.16 MEAN GRAIN SIZE IN mm.(JULY 85)
DISPOSAL SITE
M L W
INFAUNA & SEDIMENT SAMPLING STATIONS
YARDS
0
1000

Figure A-1.
Sampling Sites

One sample from each station was sent to the CoE North Pacific Division Materials Testing Laboratory for determination of sediment grain size and organic content. The remaining five box-core samples were sieved through a 0.5mm mesh screen. Organisms retained on the screen were preserved in 10 percent buffered formalin. Infaunal organisms were then picked from the sediment, counted, and identified to the lowest practical taxon.

1.16 Results. Sediments from the stations in the region of the Coquille River Interim ODMDS consist of a mixture of shells and typical coastal sands (table B-2). All stations on the north transect consisted of fine sand with a slightly coarser sand found at stations Q-1-4 and Q-1-5. The two shallowest stations on the north transect contained bay clamshell fragments, indicating they had received dredged material from previous disposal activities.

1.17 Stations in the shallower portion of the interim disposal site contained fine sand while the deeper stations (70 and 80 foot depths) contained much coarser material. Submerged rocks were encountered at the 70 and 80-foot contours of the south transect.

1.18 The benthos of the Coquille offshore disposal site was typical of nearshore high energy environments. The infaunal community of the north transsect between 40 and 70-foot depths was dominated by polychaete worms and gammarid amphipods. Extremely high abundances of *Spiophanes bombyx* occurred at stations Q-1-1 to Q-1-4 along with gammarid amphipods primarily belonging to the genera *Eohaustorius, Mandibulophoxus* and *Rhephoxynius*. Lower abundances of these species were present at stations in the interim disposal site. The species of invertebrates inhabiting the sandy portions of the study area are the more motile psammnitic (sand-dwelling) forms which tolerate or require high sediment flux. They are typical of other shallow water disposal sites such as Coos bay sites E and F (Hancock et al.).

1.19 The deeper stations Q-1-5 and Q-2-5 have a very different species composition and much less dominance by a single species due to the coarser material and patchy rocks. The infaunal composition was a rich fauna with over 131 species represented. Many of the species (eg. *Polynoidae, Sabellidae*) represented forms generally associated with coarse shell, rocks, and larger grained sediments.

1.20 Mean densities (#/m) along the northern transect increase with increasing water depth ranging from 1368 to 4175 organisms/m between the 40-foot depth contour to 4175 at the 60-foot depth contour with the 70 and 80-foot contour having intermediate values (1950 and 2277 respectively) as shown in figure A-2.

1.21 Diversity (H'), Species Richness and Equitability (J') of benthic infauna for the Coquille Interim site are shown in figure A-3.

1.22 Mean density of benthic infauna in the disposal area shows an inverse relationship with water depth. Density values range from a maximum of 99/m at 40-feet declining to 20 at 60-feet and increase slightly thereafter.

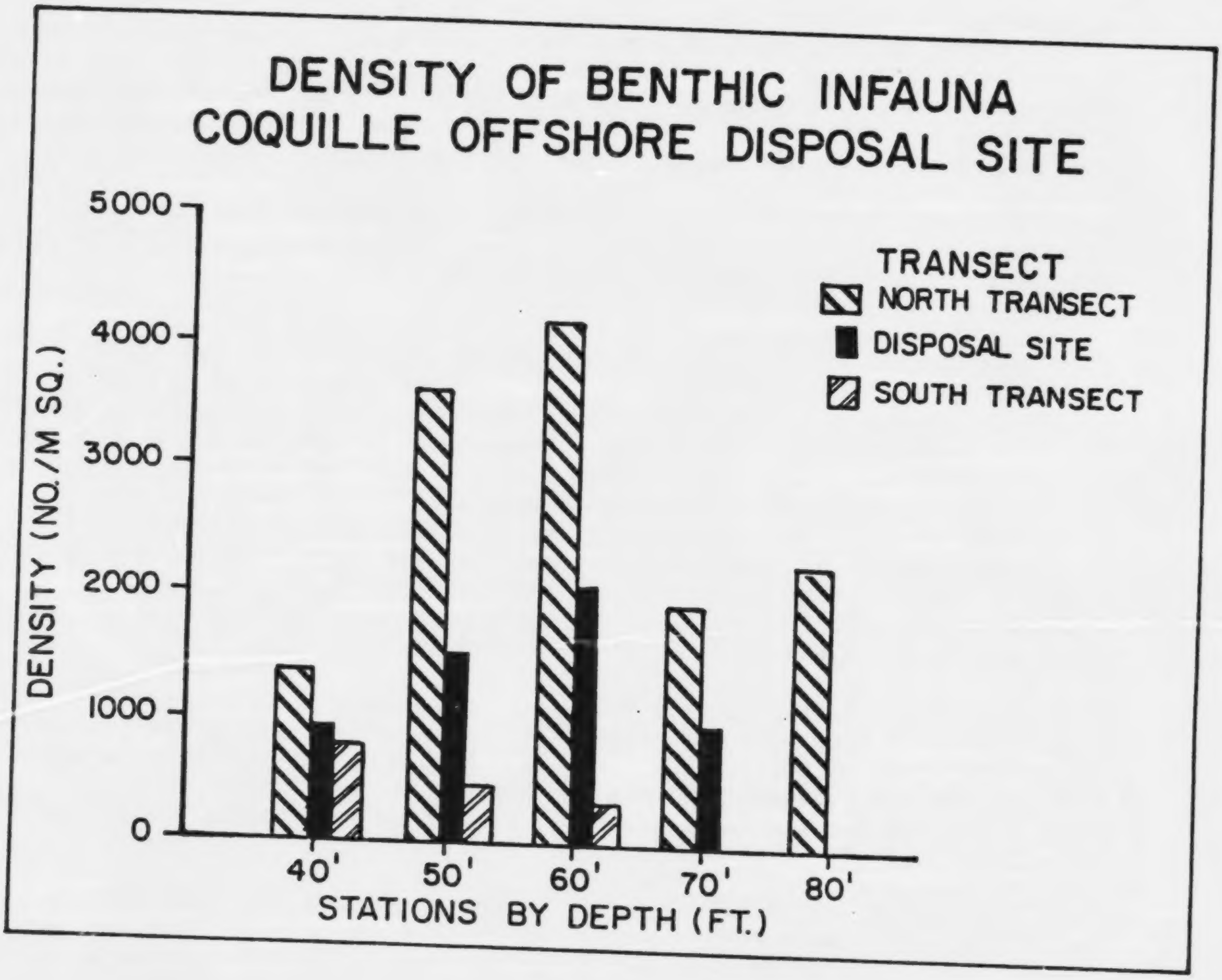


Figure A-2
Density of Benthic Infauna

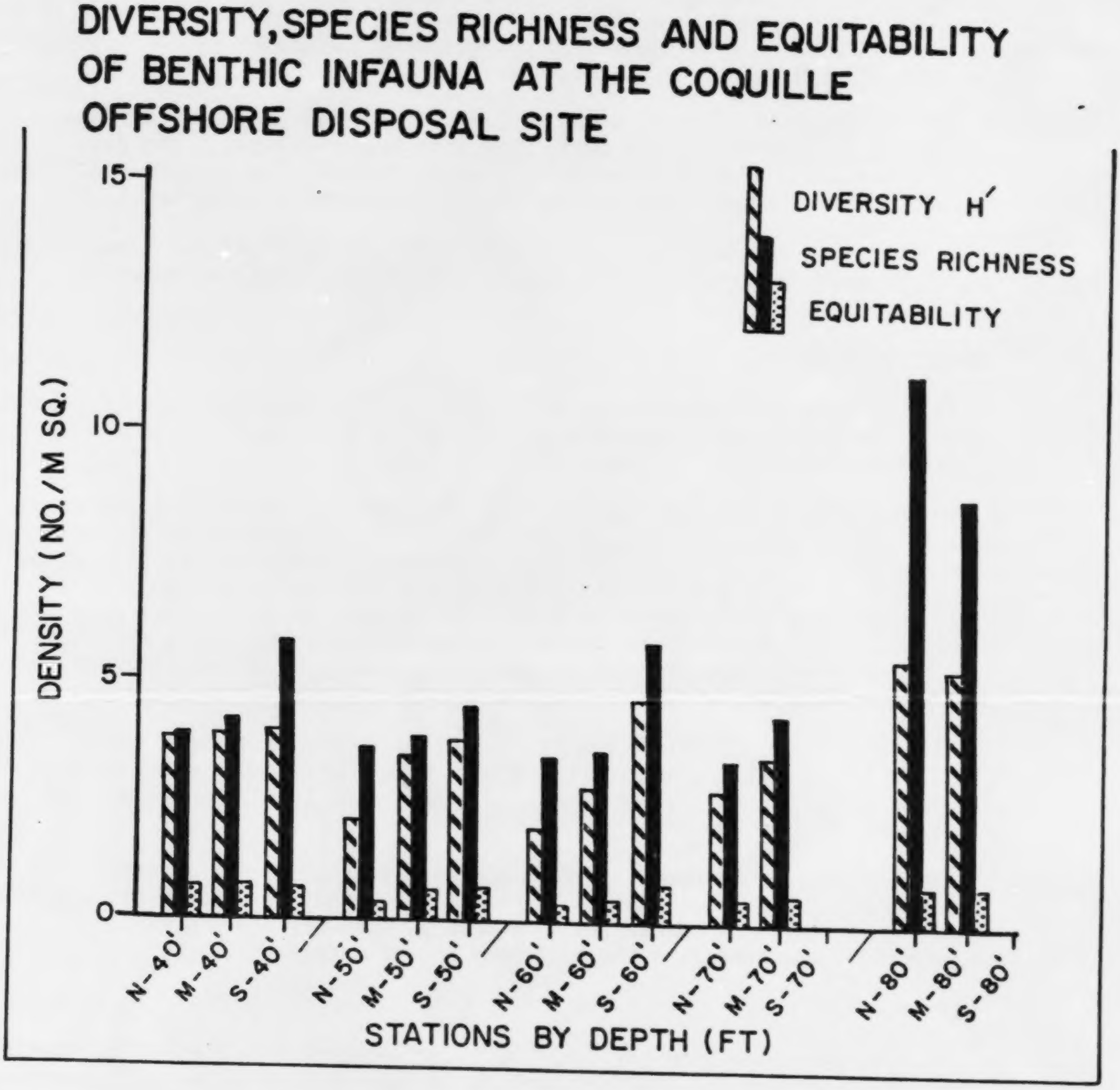


Figure A-3

Diversity, Species Richness and Equitability of Benthic Infauna

1.23 Only three stations of the southern transect could be sampled because hard substrate prevented adequate penetration of the box corer. The stations in 60- and 80-foot water depth along the southern transect had mean densities of 796, 486 and 201/m , respectively.

1.24 The Coquille offshore disposal site received 21,387 cy of dredged sediments in 1984 and 14,020 cy in 1985 from hopper dredges. The data on the abundances and diversity of benthic infauna, however, indicate no diminished values at the disposal site for the reason suggested in paragraph 1.16.

1.25 Although the interim disposal site off Coquille River has frequently received dredged sediments, the adjacent fauna show little evidence of impacts.

Macroinvertebrates

1.26 The dominant commercially and recreationally important macroinvertebrate species in the inshore coastal area are shellfish, Dungeness crab and squid. Shellfish distribution is shown in figure A-4.

1.27 Razor clam beds are located north and south of the jetty along the beach. It is generally thought that recruitment of razor clams to the inshore beaches comes from the subtidal spawning areas. Limited stocks of abalone occur in the rocky areas associated with kelp beds north and south of the estuary (figure A-4). Existing stocks are thought to be remnants of an ODFW program to introduce abalone to central Oregon. The stocks are no longer considered viable due to inhibited natural spawning resulting from the colder water temperatures.

1.28 Gaper clams, cockles, and Pittock clams likely occur near the mouth and upriver in the estuary proper. Dungeness crab adults occur on sandflat habitat along the entire Oregon coast. They spawn in offshore areas and the juveniles rear in the estuary.

1.29 The Oregon Department of Fish and Wildlife (ODFW) has recently identified a major squid spawning area off the Coquille estuary (figure A- 4). Squid spawning areas change yearly depending upon nearshore oceanic conditiions and therefore the site many not be used each year.

Fisheries

1.30 The nearshore area off Coquille River supports a variety of pelagic and demersal fish species. Pelagic species include anadromous salmon, steelhead, cutthroat trout, striped bass and shad that migrate through the estuaries to upriver spawning areas (ODFW, 1979). Other pelagic species include the Pacific herring, anchovy, surf smelt, and sea perch. Surf smelt in particular in nearshore areas and in the estuary in large numbers during the summer (ODFW, 1979).

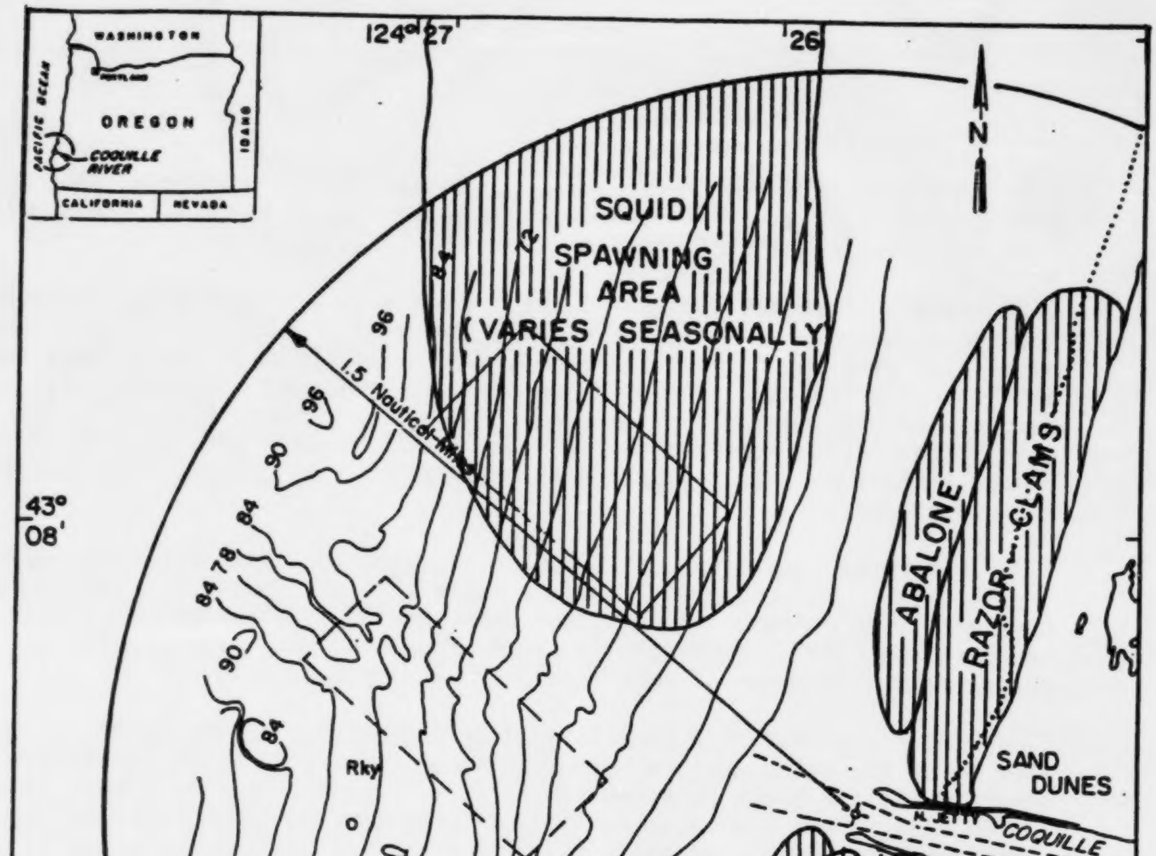

WASHINGTON
PORTLAND
OREGON
PACIFIC OCEAN
IDAHO
COQUILLE RIVER
CALIFORNIA
NEVADA
124° 27'
26
N
43° 08'
07'
SQUID SPAWNING AREA (VARIES SEASONALLY)
1.5 Nautical miles
96
90
84
78
102
72
66
60
54
48
Rky
ABALONE
RAZOR CLAMS
SAND DUNES
N. JETTY
COQUILLE RIVER
RAZOR CLAMS
SOFT SHELL CLAMS
BANDON
Rks.
Coquille Pt.
ABALONE
Rks
SCALE IN YARDS
0
1000
SHELLFISH RESOURCES

Figure A-4
Distribution of Macroinvertebrates

1.31 Though migratory species are present year-round, individual species are only present during certain times of the year. Table A-2 lists the species of fish and their periods of occurrence off the Coquille River.

1.32 Demersal species present in the inshore area are mostly residents and include a number of flatfish, sculpins, sea perch and rocky reef fish that are associated with the neritic reefs to the east and south of the estuary and the jetties. The flatfish species occur predominantly over open sandflats. Species present include English sole, sanddab, and starry flounder. English sole, sandsole and starry flounder spawn in the inshore coastal area in the summer (figure A-5) and juveniles of these as well as other marine species rear in the estuary.

1.33 The rocky reef areas off Coquille are a common feature of the southern Oregon coast. Off Coquille, they are associated with bull kelp (*Macrocystis pyrifera*) beds. These beds provide important invertebrate and fish habitat nd increase the overall productivity of the reef. A 1954 survey indicated approximately 54 acres of kelp beds off Coquille River.

1.34 The rocky reef fish community differs depending on the depth the reef lies below the water surface. The shallower reefs (<20-meter depth) are dominated by the black rockfish (*Sebastes melanops*) while the deeper reefs (20-50 meters) are dominated by lingcod (*Ophiodon elongatus*), yellow rockfish (*Sebastes ruberrimos*) and black rockfish. Fish are generally larger on the deeper reefs than the shallower reefs presumably due to a generalized movement offshore of individuals as they mature. Species composition also changes due possibly to an increase in number of lingcod on the reefs during their winter spawning period.

Commercial and Recreational Fisheries

1.35 Major commercial and recreational fishing areas are shown in figures A-6 and A-7. The predominant commercial fishery is for salmon, Dungeness crab and bottom fish. Salmon trolling and crab fishing are done over much of the area offshore of the reefs. The actual location varies from year to year depending on the abundance of fish or crabs.

1.36 ODFW has identified a squid spawning area (figure A-4) and it is possible that a commercial fishery will develop on squid if sufficient stocks exist and a market develops.

1.37 Commercial landing for the Port of Bandon for 1984 as compiled by ODFW (1985) were:

Bottomfish	10,471
Salmon (Chinook)	204
Dungeness crab	866
Total	11,541

1.38 The principal recreational fishing that occurs off Coquille River is for salmon and bottom fish. Salmon fishing is done by charter boat and private boat and occurs in the same areas as the commercial fishing but

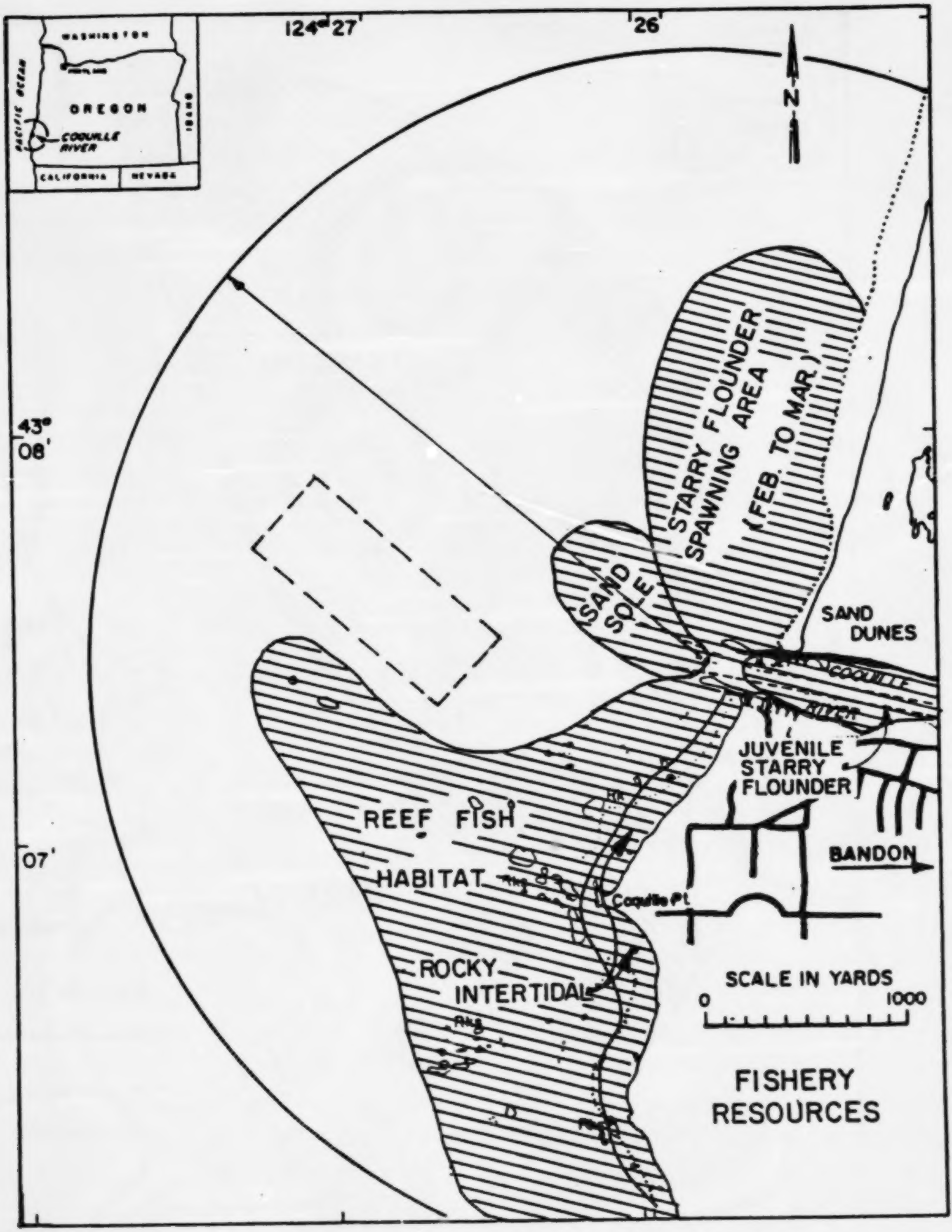
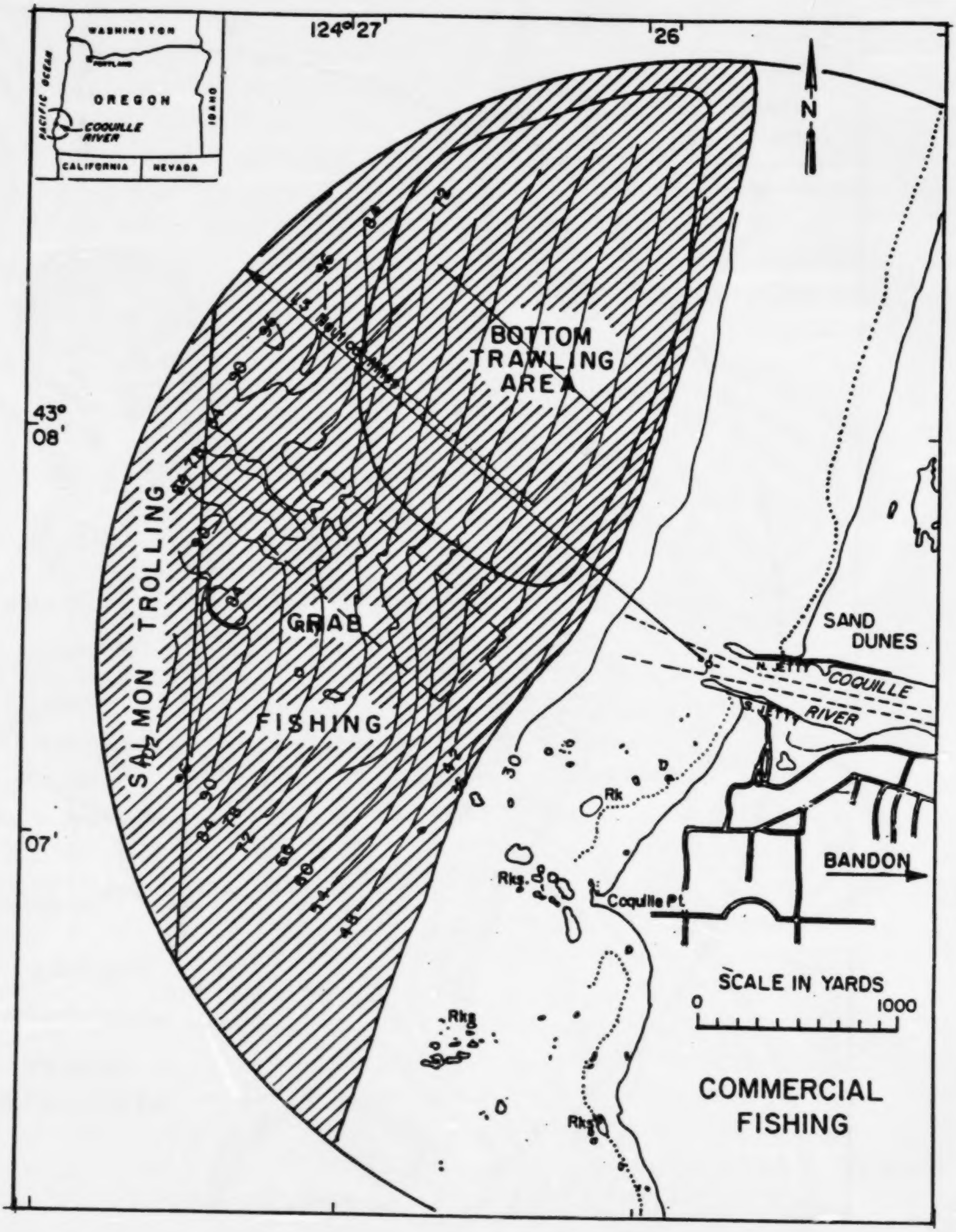

WASHINGTON
OREGON
IDAHO
PACIFIC OCEAN
COQUILLE RIVER
CALIFORNIA
NEVADA
124° 27'
26'
N
43° 08'
07'
STARRY FLOUNDER SPAWNING AREA (FEB. TO MAR.)
SAND SOLE
SAND DUNES
COQUILLE RIVER
JUVENILE STARRY FLOUNDER
REEF FISH HABITAT
ROCKY INTERTIDAL
Coquille Pt.
BANDON
SCALE IN YARDS
0
1000
FISHERY RESOURCES

Figure A-5
Distribution of Demersal Fish Species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PORTLAND
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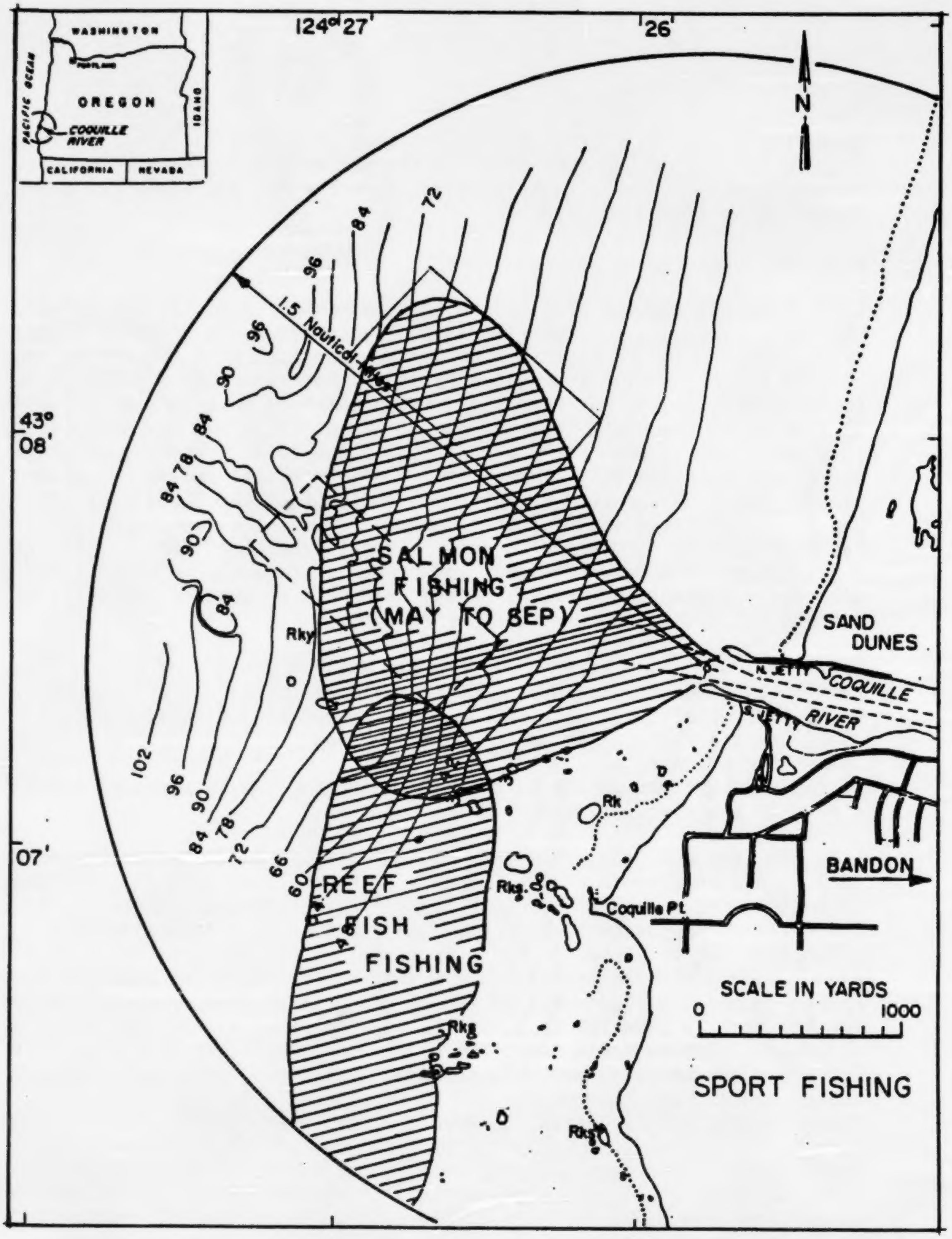
OREGON
IDAHO
COQUILLE RIVER
CALIFORNIA
NEVADA
124° 27'
26'
N
43° 08'
07'
BOTTOM TRAWLING AREA
SALMON TROLLING
CRAB FISHING
SAND DUNES
N. JETTY
COQUILLE RIVER
S. JETTY
BANDON
Rk
Rks.
Coquille Pt.
Rks
SCALE IN YARDS
0
1000
COMMERCIAL FISHING

Figure A-6
Commercial Fishing Areas


WASHINGTON
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OREGON
PACIFIC OCEAN
IDAHO
COQUILLE RIVER
CALIFORNIA
NEVADA
124°27'
26'
N
43°
08'
07'
1.5 Nautical Miles
SALMON FISHING (MAY TO SEP)
REEF FISH FISHING
SAND DUNES
N. JETTY
COQUILLE RIVER
S. JETTY
Rky
Rk
Rks.
Rks
Coquille Pt
BANDON
SCALE IN YARDS
0
1000
SPORT FISHING
102
96
90
84
78
72
66
60
96
90
84
78
30

Figure A-7
Recreational Fishing Areas

generally closer to shore. Bottom fishing, primarily for black rockfish and lingcod, is done along reef areas to the south by private charter boat. Other recreational activities include clamming in the bay and along the beach, and spearfishing along the jetties.

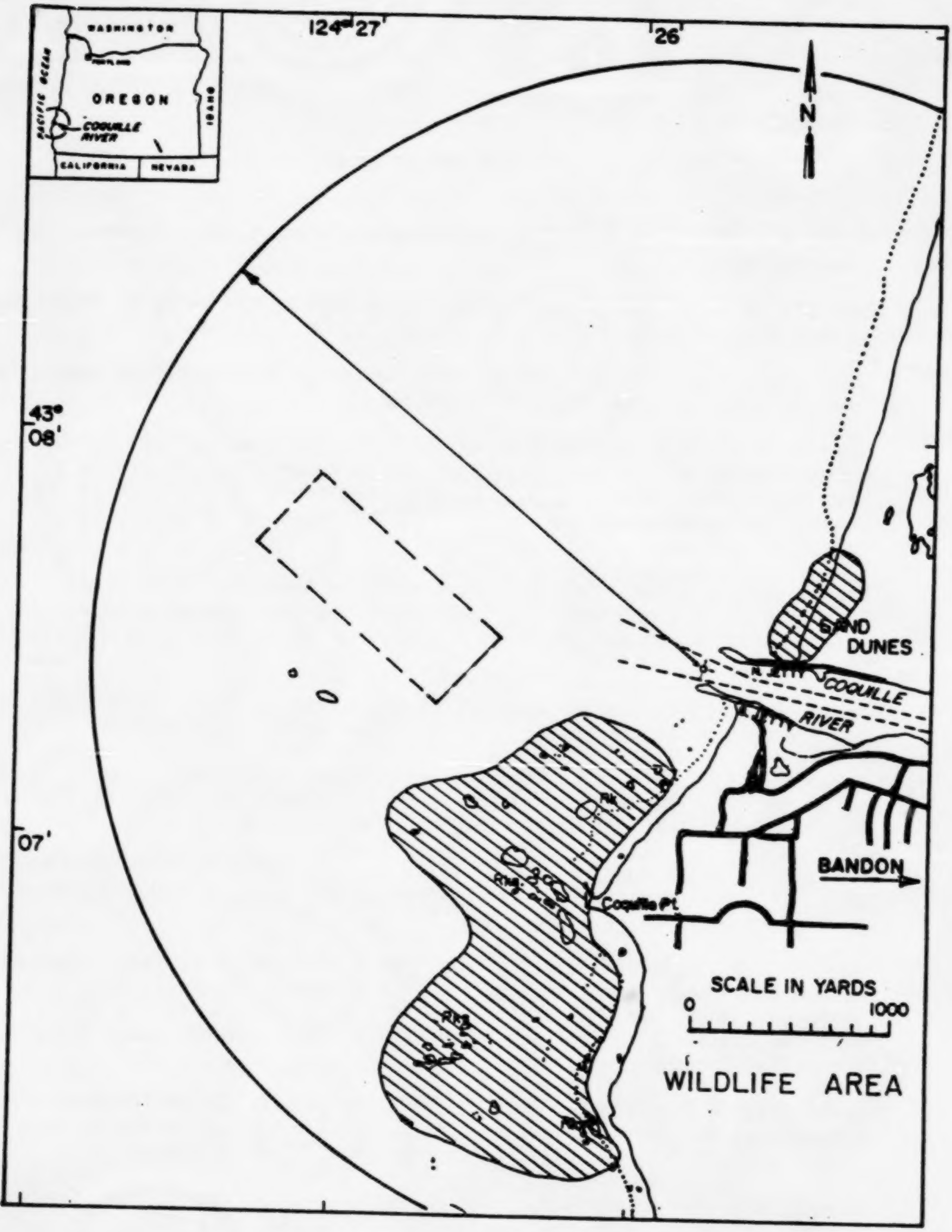
Wildlife

1.39 Numerous species of birds and marine mammals occur in the pelagic nearshore and shoreline habitats in and surrounding the proposed disposal site. Information on distribution and abundance of bird species is from the Seabird Colony Catalog (Varoujean 1979) and Pacific Coast Ecological Inventory (USFWS 1981), except as indicated. Information on most species of shorebirds is lacking so therefore their abundance and distribution can only be addressed in general terms; they occur along much of the coast primarily as migrants and/or winter residents. A few species of shorebirds including western snowy plover, black oystercatcher, killdeer, and spotted sandpiper nest along the coast. Several species of special concern: the bald eagle, peregrine falcon, and brown pelican occasionally occur along the coast and may use the ZSF or the surrounding areas. Pelicans and peregrine falcons are often associated with spits and offshore rocks. Pelagic birds (e.g. scoters, petrels) probably use the ZSF and adjacent waters for foraging.

1.40 Data on marine animals is from the Natural History of Oregon Coast Mammals by Maser et al. (1981), Pearson amd Verts (1970), and the Pacific Coast Ecological Inventory (USFWS 1981), except as indicated. Except for seals and sea lions, information on marine mammals is extremely limited. Whales are known to occur throughout coastal waters primarily during migrations, but population estimates and information on areas of special use generally are not available.

1.41 Species and habitats within the ZSF (figure A-8) may be affected, and include the area north of the Coquille River which is used as a nesting and wintering area by western snowy plovers. Western snowy plovers are listed by the State of Oregon as threatened. Brown pelicans, a federally listed endangered species, use the North Spit area at the mouth of the Coquille River. Snowy plovers nest and overwinter in the shoreline habitats from Bandon south; One fourth (13 of 49) of Oregon's breeding populatiion was located here in 1984 (OR Dept. Fish Wildl., unpubl. data). Gulls and pigeon guillemots nest on Table Rock. Coquille Point rocks are a nesting site for Leach's storm-petrels, Brandt's cormorants, pelagic cormorants, western gulls, and common murres. Cormorants amd common murres also nest on Face Rock. Approximately 100 harbor seals inhabit waters near Bandon.

1.42 Several important wildlife areas outside the ZSF potentially could be affected by disposal of dredged material. Western snowy plovers nest and winter from the Coquille River mouth north to Seven Devils, and south from Bandon to Floras Lake.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124° 27'
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43° 08'
07'
SAND DUNES
N. JETTY
COQUILLE RIVER
S. JETTY
RK.
RKS.
Coquille Pt.
BANDON
SCALE IN YARDS
0
1000
WILDLIFE AREA

Figure A - 8
Wildlife Areas

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APPENDIX B

GEOLOGICAL RESOURCES, OCEANOGRAPHIC PROCESSES AND SEDIMENT TRANSPORT OF THE COQUILLE ZSF

APPENDIX B

GEOLOGIC RESOURCES, OCEANOGRAPHIC PROCESSES AND SEDIMENT TRANSPORT OF THE COQUILLE ZSF

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APPENDIX B

GEOLOGIC RESOURCES, OCEANOGRAPHIC PROCESSES AND SEDIMENT TRANSPORT OF THE COQUILLE ZSF

1.0 GEOLOGICAL RESOURCES

Regional Setting

1.01 The Coquille River empties into the Pacific Ocean 226 miles south of the mouth of the Columbia River. It lies within the Cape Arago littoral cell, which extends for approximately 50 km from Cape Arago in the north to Cape Blanco in the south (figure B-1). The Coquille is one of the smaller Oregon estuaries (Percy et al. 1974). The watershed drains both the Oregon Coast Range and the Klamath Mountains. Along the coast to the north of the Coquille River, extensive low lying sand dunes extend inland about a quarter of a mile. These dunes are generally stabilized and subject to only minor wind erosion. Southward, rocky islands lie offshore and short beaches lie at the base of bluffs and cliffs. These cliffs are resistant remnants of eroded marine terraces. Inland, east of the river and north of Bandon, extensive mudflats and marshes predominate. The Continental Shelf extends about 20 km (12.4 miles) out from the mouth of the Coquille. There is a bank on the inner to middle shelf between Coos Bay and Coquille. Sand covers the bottom for a distance of about 5 miles out from the shore. This is replaced by a thin layer of mud or sand mixed with mud. Coinciding with the bank, the bed beyond the sand is exposed rock (Kulm 1977).

Regional Geology

1.02 The mouth of the Coquille river lies close to the boundary between the Coast Range province and the Klamath mountains. The Coquille's middle fork is generally designated as the dividing line between the two ranges, with the North Fork draining a portion of the southern Coast Range and the south fork flowing through the Siskiyous (figure B-2). The Siskiyous are the northern portion of the Klamath mountains. The predominant rocks from this range within the Coquille's drainage basin are late Jurassic marine sediments of the Otter Point Formation. These are thin bedded sandstones, siltstones, and volcanics associated with deep sea deposition. The tectonic history of the Klamath mountains is complex, with several episodes of folding and faulting which continue up to the present (Dott, 1971). The region is currently undergoing tectonic uplift, but that has been surpassed by the post Pleistocene rise in sea level.

1.03 The southern part of the Coast Range is primarily made up of marine sediments with interspersed volcanics and intrusive igneous rocks. The most widespread formation is the rhythmically bedded sandstone of the Tyee formation of Eocene age. Other sedimentary formations of importance in the Coquille's drainage basin are the Coaledo Formation, the Flournoy Formation and the Roseburg formation (figure B-3). The igneous rocks include pillow basalts of early Eocene age and Oligocene gabro intrusions. Uplift of the

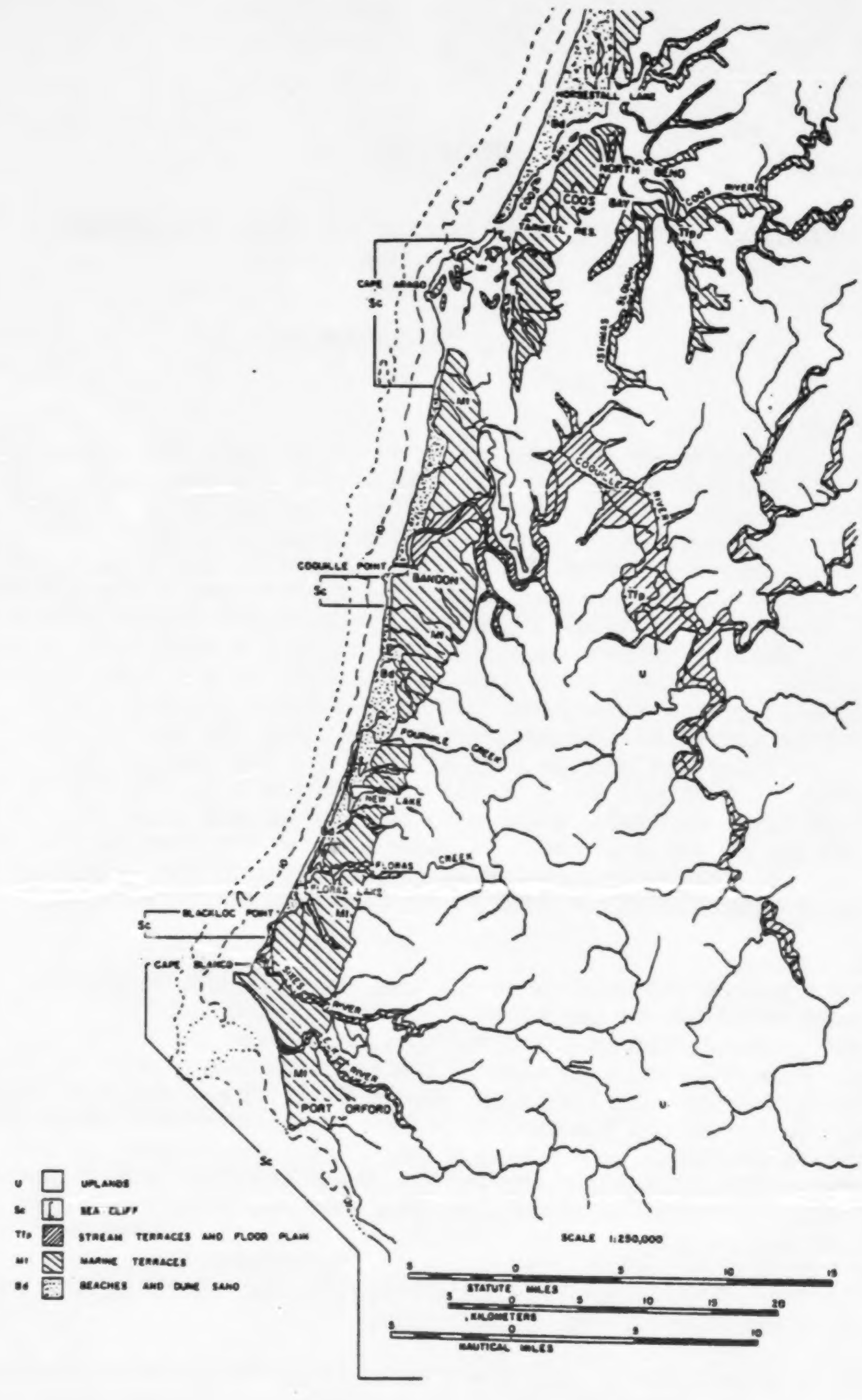

HORSESTALL LAKE
Bd
NORTH BEND
COOS BAY
COOS RIVER
TARHEEL RES.
TTp
ISTHMUS SLOUGH
CAPE ARAGO
Sc
Mt
COQUILLE RIVER
COQUILLE POINT
BANDON
Sc
Mt
TTp
U
Bd
FOURMILE CREEK
NEW LAKE
FLORAS CREEK
FLORAS LAKE
Mt
BLACKLOC POINT
Sc
CAPE BLANCO
SIXES RIVER
ELK RIVER
Mt
PORT ORFORD
U
Sc
U UPLANDS
Sc SEA CLIFF
TTp STREAM TERRACES AND FLOOD PLAIN
Mt MARINE TERRACES
Bd BEACHES AND DUNE SAND
SCALE 1:250,000
5 0 5 10 15
STATUTE MILES
5 0 5 10 15 20
KILOMETERS
5 0 5 10
NAUTICAL MILES

Figure B-1
Coastal Landforms of the Cape Arago Littoral Cell

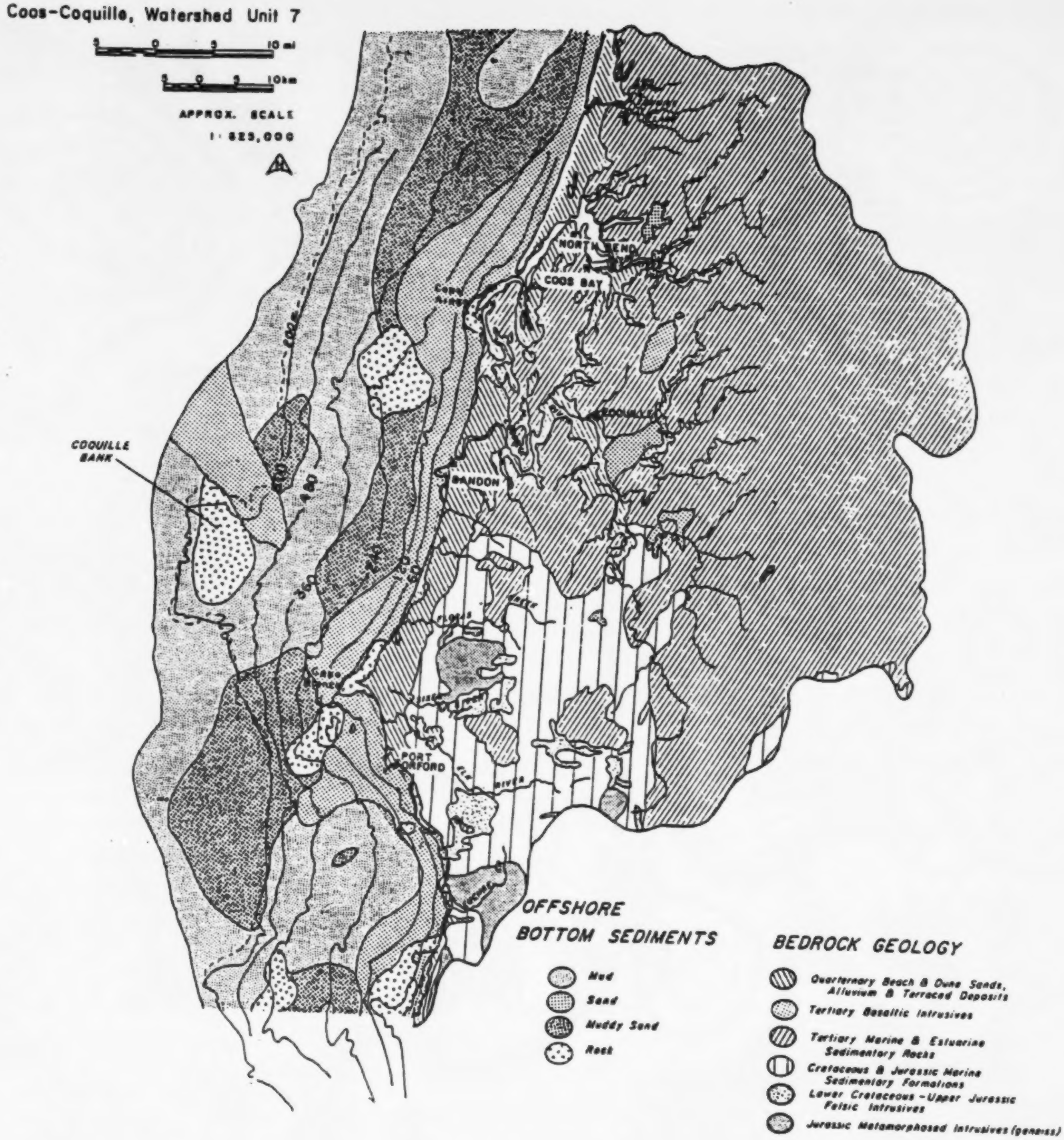
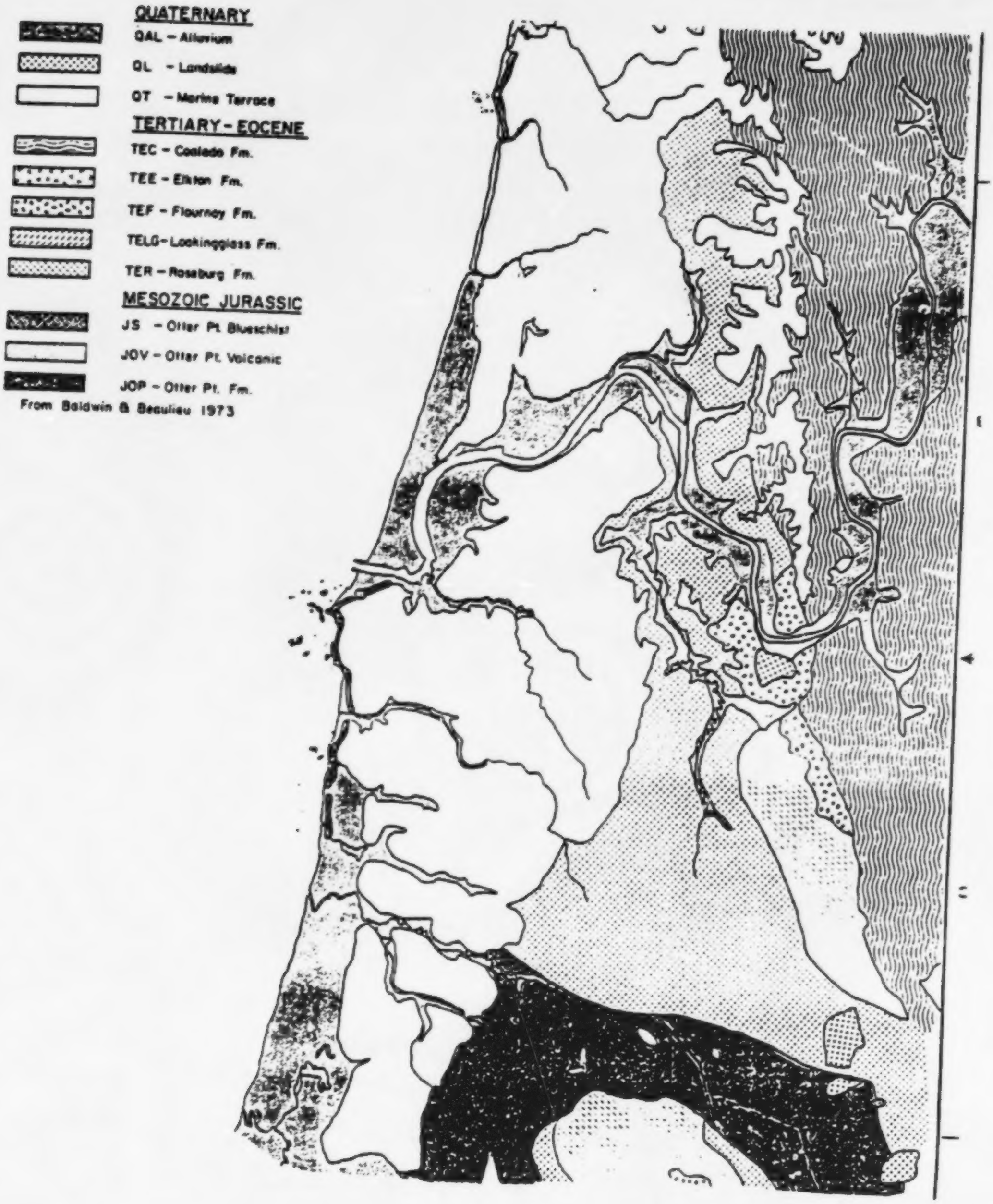

Coos-Coquille, Watershed Unit 7
5 0 5 10 mi
5 0 5 10km
APPROX. SCALE
1 : 625,000
COQUILLE BANK
NORTH BEND
COOS BAY
BANDON
COQUILLE
PORT ORFORD
200m
480
360
240
60
OFFSHORE BOTTOM SEDIMENTS
Mud
Sand
Muddy Sand
Rock
BEDROCK GEOLOGY
Quarternary Beach & Dune Sands, Alluvium & Terraced Deposits
Tertiary Basaltic Intrusives
Tertiary Marine & Estuarine Sedimentary Rocks
Cretaceous & Jurassic Marine Sedimentary Formations
Lower Cretaceous - Upper Jurassic Felsic Intrusives
Jurassic Metamorphosed Intrusives (geneiss)

Figure B-2
Geology of the Coquille Watershed
and Distribution of Offshore Sediments


QUATERNARY
QAL – Alluvium
QL – Landslide
QT – Marine Terrace
TERTIARY-EOCENE
TEC – Coaledo Fm.
TEE – Elkton Fm.
TEF – Flournoy Fm.
TELG – Lookingglass Fm.
TER – Roseburg Fm.
MESOZOIC JURASSIC
JS – Otter Pt. Blueschist
JOV – Otter Pt. Volcanic
JOP – Otter Pt. Fm.

From Baldwin & Beaulieu 1973

Figure B-3
Bedrock Geology
in the Vicinity of the Mouth of the Coquille River

Coast Range began in the Miocene (Baldwin, 1981, Baldwin and Beauligu, 1974).

1.04 During the Pliocene and Pleistocene the southern Oregon coast underwent several episodes of relative submergence and emergence. This, plus the continued uplift led to the formation of several raised marine terraces as well as the incision of valleys to below the present sea level. At Coquille at least two stages of downcutting through pre-Tertiary formations were followed by periods of infilling. The early Pleistocene Coquille River cut wn to a lowered sea level. The resulting valley was filled by the Coquille Formation as the sea level rose again. Subsequently, a second period of downcutting was followed by late Pleistocene and Holocene infilling. The modern river is deflected southward by a sand spit to the southern edge of the last fill (Baldwin, 1981).

1.05 The coastal plain on both sides of the estuary's mouth iscovered by sand dunes that overlie marine terraces. These dunes are at least 80,000 years old. They had their origin at the end of past high stands of the ocean when they advanced landward by eolian transport. The sand comprising the dunes was primarily derived from eroding rocks in the Coast Range and unconsolidated marine terraces. These sediments were carried to the ocean by streams and then returned to the land by onshore winds. The rise in sea level "drowned" the river and stream valleys that had been incised in the Coast Range and coastal plain. This produced the estuary and allowed the development of the alluvial plains bordering the lower reaches of the Coquille River.

Economic Geology

1.06 Large offshore deposits of black sands have been identified a few miles to the northwest of the Coquille River mouth, but none within the ZSF. This deposit was found to have a black sand concentration of between 10% to 30%. Minerals of primary interest in black sands are gold, platinum, and chromite, but the sands also contain numerous other heavy minerals (Baldwin & Beauligh 1973). The offshore deposits found near the Coquille are not currently being mined, but sites are being considered for exploration in 1988 (Peterson, per. com.).

1.07 A large gravel deposit is located to the southwest of the ZSF. Included within the deposit is a gold anomaly zone with a concentration of over 0.005 ppm gold. The gravels are being considered as a potential future source of aggregate for urban areas in California. The gold could conceivably add to the attractiveness of the deposits by compensating for some of the dredging costs (Gray and Kulm 1985). While there have been several attempts to find oil and gas along the Oregon coast, no test well has turned up more than traces of oil and gas. The offshore well nearest the mouth of the Coquille was about 12 miles to the northwest, and nothing more was found than traces of gas. Wells just a few miles inland of the mouth were no luckier.

Sediments

1.08 The Coquille's estuary covers about 760 acres (Percy and others 1974). The mean diurnal tidal prism is $1.77 * 10^8$ cu ft. The Coquille River drains an area of 1,058 sq. mi. Mean annual discharge is 3,288 cfs (cubic feet/second) with the greatest flow in January, averaging 7600 cfs and low flow in September of about 200 cfs. The mean annual discharge * 6 hours is 0.7 * 10#8 cu ft. This gives a hydrographic ratio of about 2.5, indicating that the estuary is fluvially dominated and that bedload sediment will be transported into the ocean. (Peterson, pers. com. 1986). From estimates by Karlin (1980) the amount of sand and gravel that could be added to the ZSF by the Coquille River each year ranges from 20-50,000 cubic yards.

1.09 A second source of sediment is coastal erosion. Studies providing information on specific rates of erosion and material contribution are sadly lacking. The National Shoreline Study (COE 1971) identified areas of "non-critical erosion" within the Cape Arago Littoral Cell at Cape Arago, Cape Blanco and in the vicinity of Floras Lake. In another study "ocean undercutting" was recorded along numerous other segments of the coast (USDA 1974). In neither study was any data given on erosion rates.

1.10 The coastline bordering the Cape Arago littoral cell consists primarily of beaches, most fronting sand dunes or Quaternary coastal terrace deposits (figure B-3). The beaches make up about 24.5 miles of the total 35 miles of coast. A little less than 9 miles of the coast are sea cliffs and 2 miles at the mouth of the Sixes River are fluvial deposits (Beaulieu et al. 1974). The sea cliffs are the only places where the sea can regularly attack bedrock and marine terraces. At Cape Arago, the rock is Tertiary sediments of the Coaledo formation. Five Mile Point, Coquille Point, Blacklock Point and Cape Blanco all provide exposures of Jurassic Otter Point formation, with additional exposures of Jurassic serpentines and Cretaceous sediments at Blacklock Point. The very fact that the bedrock is exposed at capes and points shows that they are relatively erosion resistant. Because the exposed bedrock also has a limited linear extent the potential and actual contribution of sediment from this source is very small. Landslides are a potentially significant source of sediment, but the only one mapped within the Cape Arago littoral is on the north side of Cape Blanco.

1.11 Dredging provides another quantifiable source of sediment for the littoral zone. Within the Cape Arago littoral cell 59,000 cubic yards of offshore disposal of dredged material has occured annually off the mouth of the Coquille River. The type of material contributed by dredging depends on both the location and hydrologic conditions. Dredging during or just after high flows is more likely to pick up fluvial sediments than dredging done during periods of low flow when marine sediments have intruded into the mouth. By the same token, the further upstream dredging is done the more likely it is that fluvial sediments will be encountered.

1.12 Dredging of the Coquille River began in 1897 with the first dredging of the entrance bar and subsequent ocean disposal occurring in 1920. Since then, over 2.4 million cy have been disposed of at sea. The yearly annual dredging volume from 1976 to 1985 has averaged 59,102 cy. Variation has been great, with a maximum of 101,373 cy in 1982 and a minimum of 2,500 in 1980 (table B-1). Dumping at the interim offshore site began in 1977. Dredging is done to maintain a channel 13 feet deep from the mouth upstream to one mile above the old Coquille River lighthouse. Shoaling occurs between the jetty ends at the channel entrance. The shoal builds out from the north jetty to mid channel, and in some years across the entire channel. A second shoal forms across the whole channel between RM 0.2 and 0.5.

Table B-1

Dredging Volumes* at Coquille

Year	Cubic Yards (C.Y.)
1976	95,250
1977	37,000
1978	90,750
1979	82,800
1980	2,500
1981	115,910
1982	101,373
1983	30,025
1984	21,387
1985	14,020
10-Year Average	59,102

*Includes both Corps and contract hopper dredging.

Sediments taken from areas where the Coquille River is dredged for disposal at sea have a median grain size that is, for the most part, slightly coarser than the native offshore sediments. Fines are almost nonexistent in this material, but several samples contain some coarse sand and fine gravel (tables B-2 and B-3). A series of samples were taken in 1981 from the entrance to the Coquille upstream to RM 1.2 (figure B-4). The material close to the entrance had a finer mean grain size than around RM 1 and 1.2. All but one sample contained more than 10% larger than 0.5 mm and 5% larger than 1.0 mm. The quantity of the coarse material decreased downstream until RM 00+00 (at the entrance) where the sample contained more material larger than 1.0 mm than any of the other samples. In contrast, samples taken in 1970 and 1971 contained very little material larger than 0.5 mm. This variation in the size of the coarsest fraction over time is probably a result of the alternating dominance of fluvial and littoral sources. Long periods of high discharge (giving a short term low hydrographic ratio) would carry coarse material through the system, while low discharge (giving a short term high hydrographic ratio) would allow finer marine sands to migrate upstream. The quantities of the coarse material do not appear to be sufficient to create any problems for sediment compatibility at the offshore disposal site. The samples taken from within the current disposal site do not show any effect of dumping on the grain size analysis.

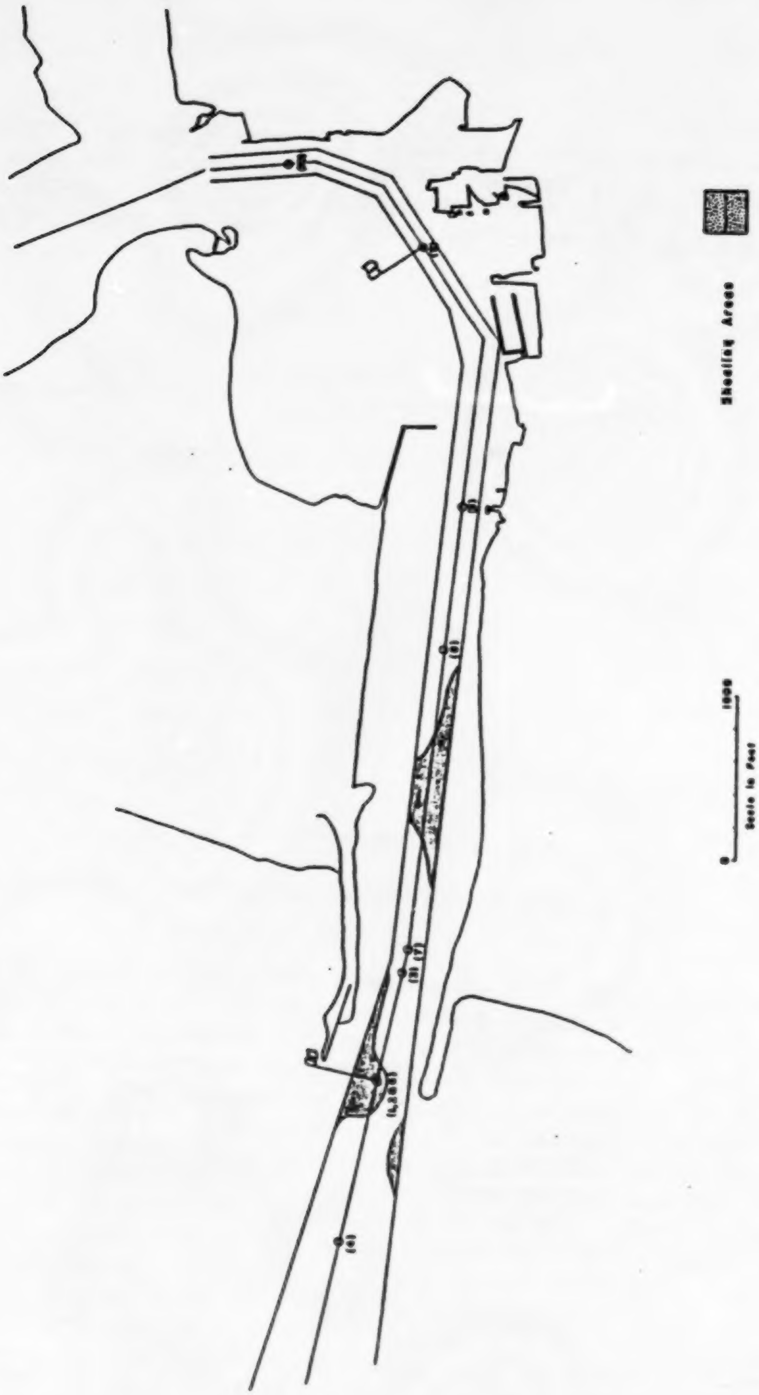

B
B
Shoaling Areas
0
1000
Scale in Feet

Figure B-4
Shoaling Locations and Sampling Sites
at the Mouth of the Coquille River

TABLE B-2

Coquille Offshore Sediment Samples

Site	Sample	Mz (mm)	D50	D90	%fines	Depth
q1-1	q-7	0.16	0.16	0.26	1	40
q1-2	q-18	0.16	0.15	0.26	1	50
q1-3	q-20	0.16	0.16	0.26	1	60
q1-4	q-6	0.16	0.14	0.43	1	70
q1-5	q-28	0.09	0.09	0.15	27	80
q2-1	q-55	6.90	0.18	0.28	1	40
q2-2	q-53	1.05	0.16	0.30	1	50
q2-3	q-43	0.19	0.16	0.30	1	60
q2-4	q-41	0.16	0.19	0.42	1	70
q2-5	q-31	0.16	36.8	72.0	0	80
q2-5	q-34	0.17	0.90	5.0	0	80
q3-1	q-64	0.20	0.20	0.29	2	35
q3-2	q-68	0.17	0.18	0.29	1	40
q3-3	q-72	0.17	0.18	0.46	9	55

Note: Mean grain size (Mz) calculated using Folk and Ward's (1954) parameters. Grain size given in millimeters.

TABLE B-3

Coquille River Entrance Samples

Location	Date	D50	D90	%fines
(1) Ent. Sta.0+00	8/25/70	0.23	0.30	0
(2) Bandon Bar	11/10/71	0.23	0.30	0
(3) Bar Ent. St00 to St09	9/02/72	0.23	0.40	0
(4) Mile 0 - 10+00	8/26/75	0.21	0.70	0
(5) Near USCG dock	7/13/77	0.25	0.42	0
(6) RM 00+00	2/18/81	0.28	2.4	0
(7) 1000' west of lighthouse	2/18/81	0.24	0.30	0
(8) 1000' east of lighthouse	2/18/81	0.20	0.60	0
(9) RM 1.0	2/18/81	0.47	0.96	0
(10) RM 1.2	2/18/81	0.46	2.0	0

Note: Grain size given in millimeters.

Conditions in the ZSF

1.13 The bed topography offshore in the vicinity of the designated disposal area is varied and complex (figure B-5). To the north of the Coquille River mouth the bed slopes evenly at about 1 1/1000 from 24 to 84 feet depth. South of the mouth, a line of islets, skerries and submerged rock pinnacles runs to the northwest. Below 84 feet in depth, there is a rocky reef with an irregular surface featuring both hollows and high points. No evidence of a mound of disposed dredged material was found in the July 1985 survey. The headlands, stacks, and, presumably, the rocky submarine outcrops south of the mouth of the Coquille River are composed of the Otter Point Formation of Late Jurassic age (Lund 1973; Beaulieu and Hughes, 1975). The more durable units within the Otter Point Formation form the stacks and islands off Coquille Point. No faults have been recognized that can be projected into the study area from the onshore geologic mapping. Offshore geologic mapping has been extended to within 4 to 5 km of the shore off the mouth of the Coquille River (Clarke and others 1981).

1.14 Because of the substantial distances involved (4 to 5 km), it is not possible to extrapolate offshore geologic mapping. An anticline was mapped as having an axial trend of N 30 W which, if projected 4 km to the southeast, extends into the area around the mouth of the Coquille River. Mapping also shows a fault with a trend of N 30 W which, if projected 5 km to the southeast, would also pass through the Coquille study area. This fault is downthrown on the northeast and cuts Acoustic Unit 2 inferred to be of late Miocene to Pleiocene age.

1.15 Figure B-5 shows the results of the July 1985 sidescan sonar survey of the Coquille ZSF. Within the surveyed area fine sand covers the bottom in the north and central portions and along the southwest edge. There are scattered rock exposures in the northeast corner and eastern section. The easternmost lobe of the survey showed a pocket of coarse sand or gravel bordered on one side by some fine sand and scattered rock exposures on the other. A wide band of exposed rock runs from the northwest side over to the southeast. The interim disposal site crosses all three major bottom types. The nearshore end has scattered rock exposures, fine sand crosses the middle, and bare rock is exposed at the offshore end and the nearshore half of the southwest side. The proposed designated disposal site, on the other hand, comprises almost exclusively fine sand sea bed. There are only a few small rock outcrops exposed within the sites boundaries.

1.16 Seismic profiles (figures B-6a, b, and c) show unconsolidated sediment of greatly varying thickness overlying a very irregular bedrock surface. Profile 1 has a sediment layer ranging from 0 to 30 feet. The second profile has an abrupt transition from exposed rock to 150 feet of unconsolidated sediment and back again. That profile may have transversed the channel cut by the Coquille at a lower sea level. Profile 3, which crosses the proposed new disposal site, has a continuous layer of sediment that varies between 20 to 60 feet thick.

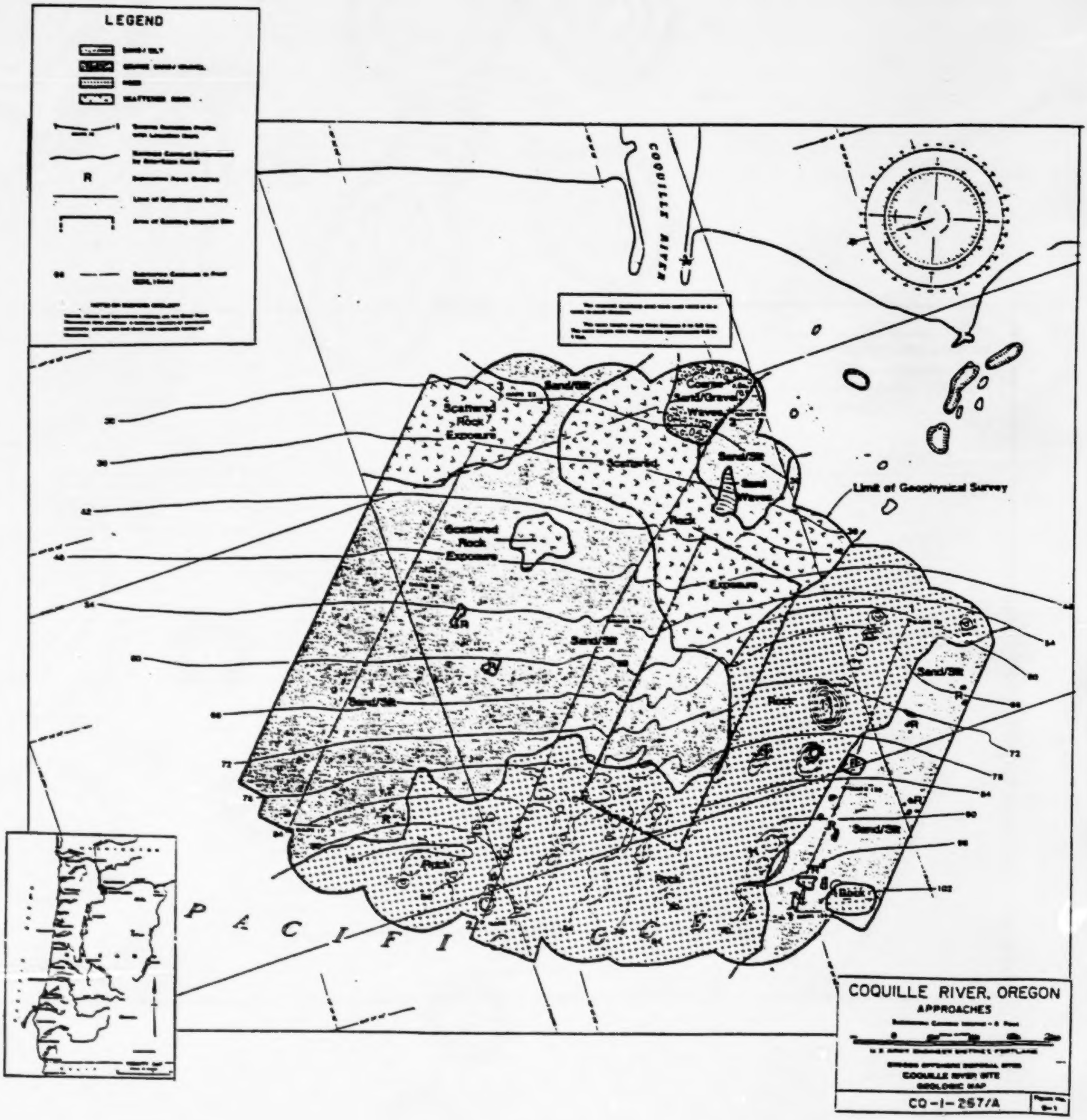

LEGEND
R
COQUILLE RIVER
Scattered Rock Exposure
Sand/Silt
Coarse Sand/Gravel Waves
Scattered
Sand Waves
Limit of Geophysical Survey
Rock
Exposure
PACIFIC OCEAN
30
36
42
48
54
60
66
72
78
84
90
96
102
COQUILLE RIVER, OREGON
APPROACHES
CO-1-257/A

Figure B-5
Surface Geology and Bathymetry of the Coquille ZSF

LEGEND

COQUILLE RIVER PROFILE NUMBER 1

ELEVATION DATUM IS MLLW
FROM FATHOMETER RECORDINGS

LOCATION BY PORTLAND DISTRICT,
COE

NOTES ON BEDROCK GEOLOGY:
Bedrock consists of the Otter Point Formation - a complex mixture of graywacke sandstone, greenstone and chert with scattered bodies of blueschist (late Jurassic).

US ARMY CORPS OF ENGINEERS
PORTLAND DISTRICT
COQUILLE RIVER,
OREGON OFFSHORE SURVEY

SUBBOTTOM PROFILES
PROFILE NUMBER 1
NORTHWEST—SOUTHEAST

OCTOBER 1984
GEO-RECON INT'L SEATTLE, WA
J84-293

Earth Sciences Associates
Palo Alto, California

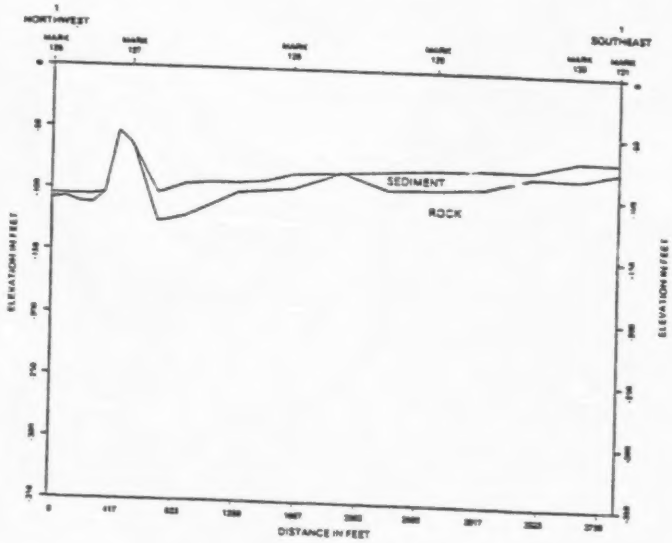
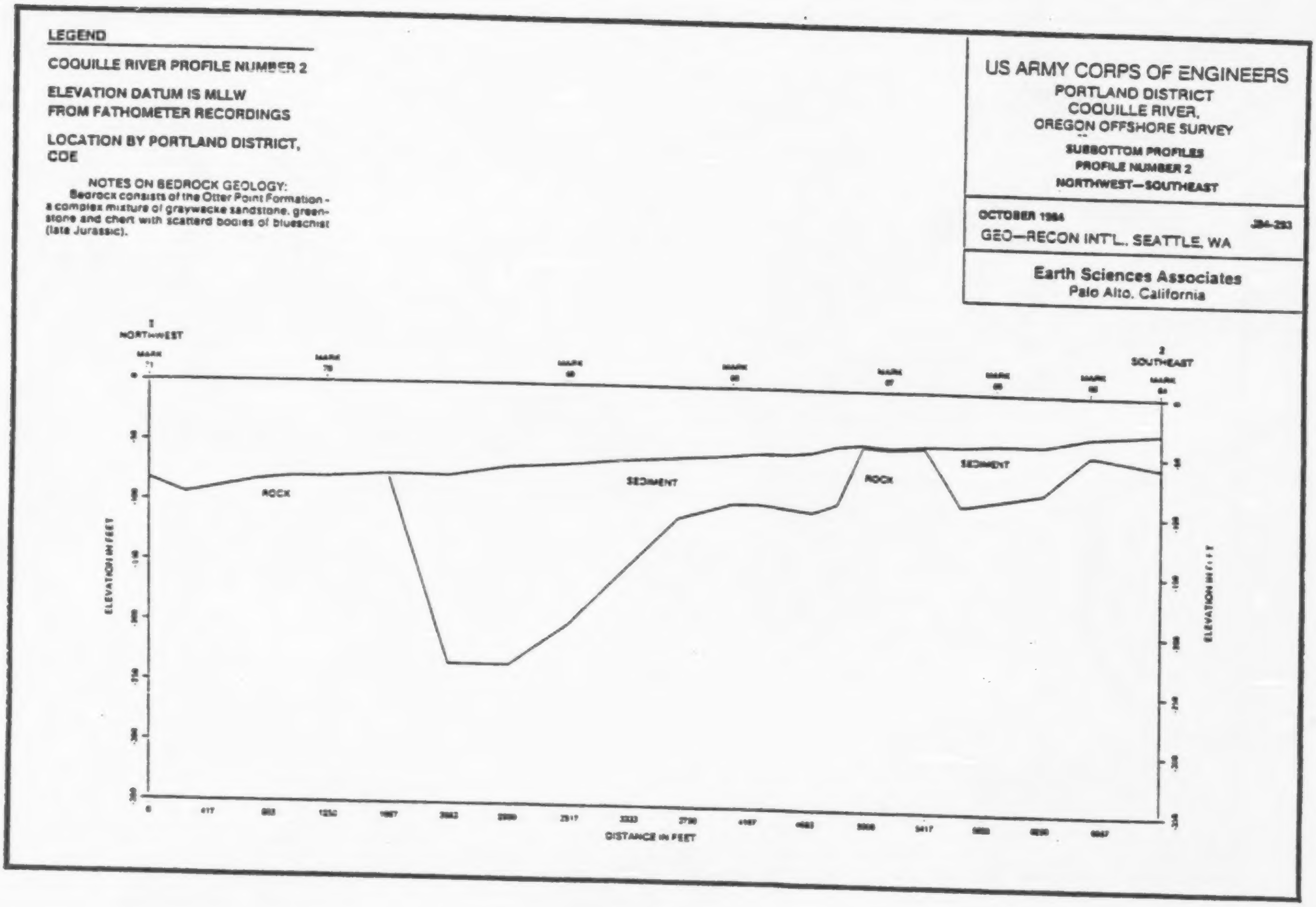


Figure B-6a
Seismic Profile Number 1 of the Coquille ZSF



LEGEND

COQUILLE RIVER PROFILE NUMBER 2

ELEVATION DATUM IS MLLW
FROM FATHOMETER RECORDINGS

LOCATION BY PORTLAND DISTRICT,
COE

NOTES ON BEDROCK GEOLOGY:
Bedrock consists of the Otter Point Formation - a complex mixture of graywacke sandstone, greenstone and chert with scatterd bodies of blueschist (late Jurassic).

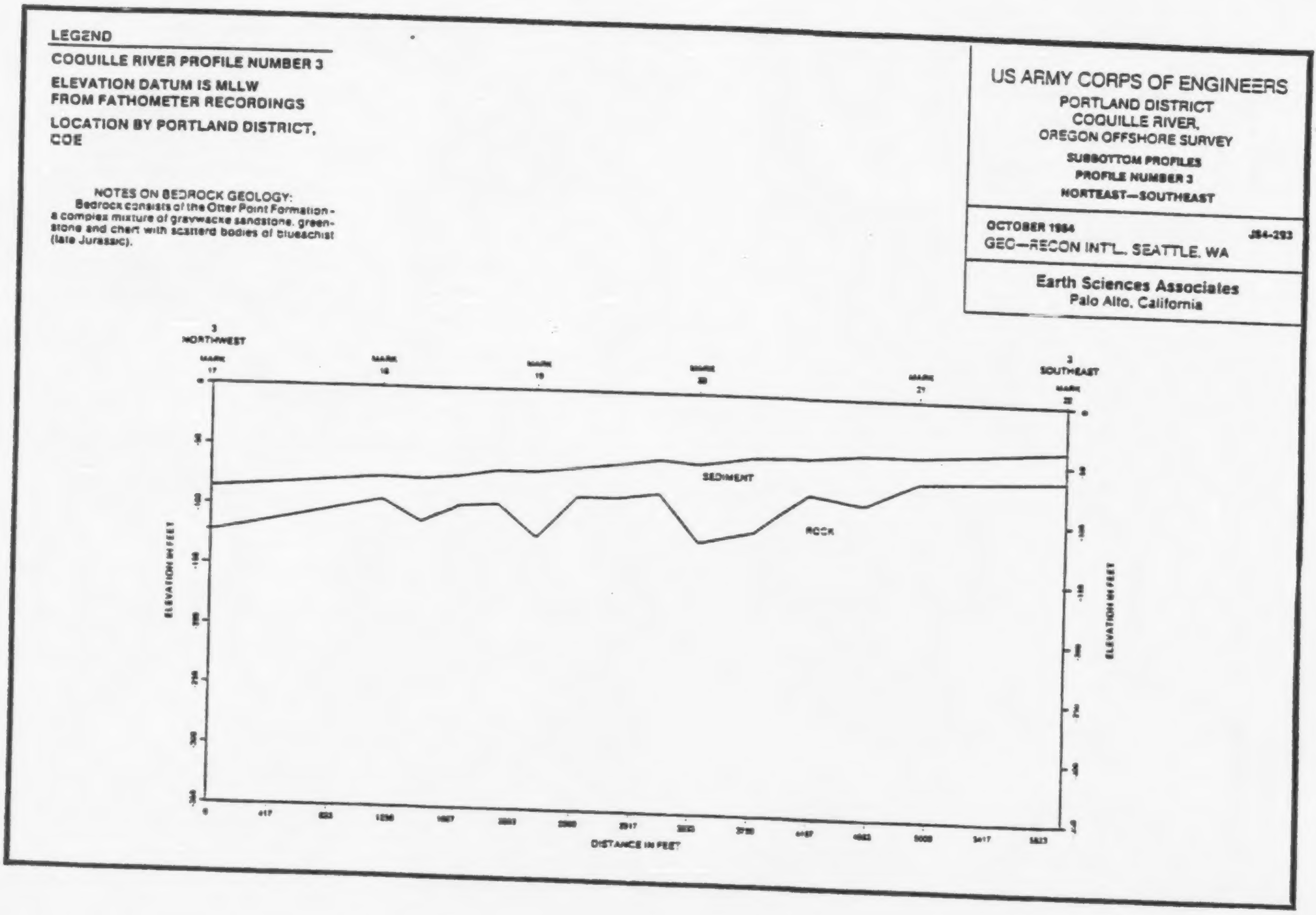
US ARMY CORPS OF ENGINEERS
PORTLAND DISTRICT
COQUILLE RIVER,
OREGON OFFSHORE SURVEY

SUBBOTTOM PROFILES
PROFILE NUMBER 2
NORTHWEST—SOUTHEAST

OCTOBER 1984 J84-293
GEO—RECON INT'L., SEATTLE, WA

Earth Sciences Associates
Palo Alto, California

Figure B-6b
Seismic Profile Number 2 of the Coquille ZSF



LEGEND

COQUILLE RIVER PROFILE NUMBER 3

ELEVATION DATUM IS MLLW
FROM FATHOMETER RECORDINGS

LOCATION BY PORTLAND DISTRICT,
COE

NOTES ON BEDROCK GEOLOGY:
Bedrock consists of the Otter Point Formation - a complex mixture of graywacke sandstone, greenstone and chert with scatterd bodies of blueschist (late Jurassic).

US ARMY CORPS OF ENGINEERS
PORTLAND DISTRICT
COQUILLE RIVER,
OREGON OFFSHORE SURVEY
SUBBOTTOM PROFILES
PROFILE NUMBER 3
NORTEAST—SOUTHEAST

OCTOBER 1984 J84-293
GEO—RECON INT'L., SEATTLE, WA

Earth Sciences Associates
Palo Alto, California

3
NORTHWEST
MARK 17
MARK 18
MARK 19
MARK 20
MARK 21
3
SOUTHEAST
MARK 22
SEDIMENT
ROCK
ELEVATION IN FEET
ELEVATION IN FEET
0
417
833
1250
1667
2083
2500
2917
3333
3750
4167
4583
5000
5417
5833
DISTANCE IN FEET

Figure B-6c
Seismic Profile Number 3 of the Coquille ZSF

1.17 The surface sediment in the area near the disposal site is almost all fine sand (figure B-7). Samples taken in 1984 range between 0.20 and 0.16 mm mean grain size (table B-2). Within the disposal site the sediment is the same size, except for two at the outside end. These samples, which were taken from an area interpreted as bare rock from the sidescan sonar survey, had mean grain sizes of 1.05 and 6.77 mm. The relative coarseness of these samples indicate that they may contain material derived from the nearby exposed rock. Two samples had anomalously high percentages of fines. In all probability those samples contained clasts of silt that became disaggregated during grain size analysis.

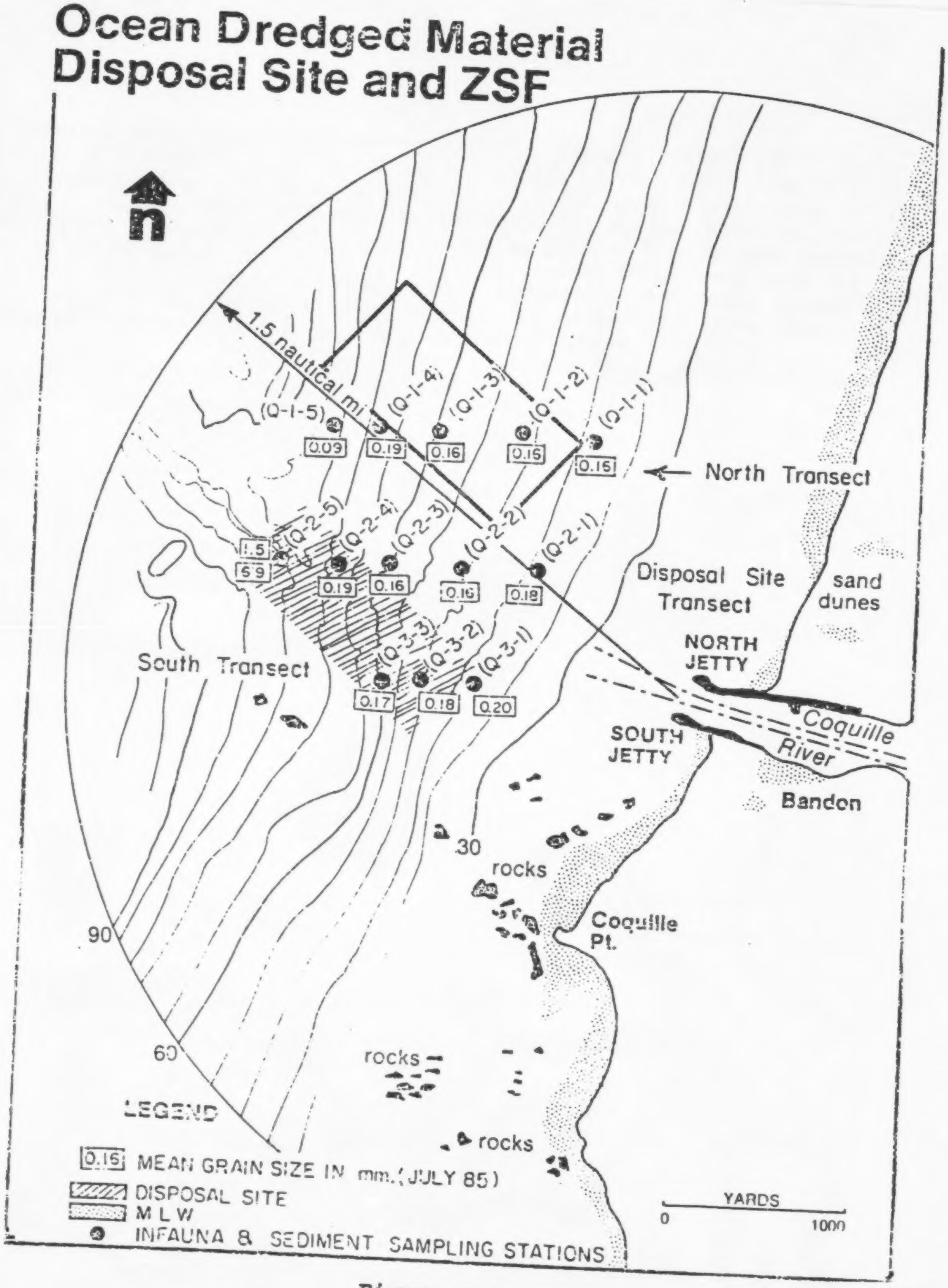

Ocean Dredged Material Disposal Site and ZSF
n
1.5 nautical mi
(Q-1-5)
0.09
(Q-1-4)
0.19
(Q-1-3)
0.16
(Q-1-2)
0.15
(Q-1-1)
0.16
North Transect
(Q-2-5)
1.5
6.9
(Q-2-4)
0.19
(Q-2-3)
0.16
(Q-2-2)
0.16
(Q-2-1)
0.18
Disposal Site Transect
sand dunes
NORTH JETTY
South Transect
(Q-3-3)
0.17
(Q-3-2)
0.18
(Q-3-1)
0.20
SOUTH JETTY
Coquille River
Bandon
30
rocks
Coquille Pt.
90
60
rocks
rocks
LEGEND
0.15 MEAN GRAIN SIZE IN mm.(JULY 85)
▨ DISPOSAL SITE
M L W
● INFAUNA & SEDIMENT SAMPLING STATIONS
YARDS
0
1000

Figure B-7
Sediment Samples from the Coquille ZSF

2.0 OCEANOGRAPHIC PROCESSES

Coastal Circulation

2.01 The factors influencing nearshore circulation and related sediment transport include large-scale regional currents, deep water ocean waves, local winds and waves, river discharge and tides. The circulation patterns are highly variable both in space and over time, and generalizations for a specific site or for long term predictions from short-term data is risky. The following discussion includes a general description of regional processes, more specific information on local processes, site-specific monitoring and the resulting circulation at Coquille.

2.02 Regional currents off Oregon are driven by large-scale currents and weather patterns in the northwestern Pacific Ocean (Parmenter and Bailey, 1985). The North Pacific Current is a relatively constant current that moves eastward across the northern Pacific Ocean approaching land near Vancouver Island. The deflection of the North Pacific Current to the south becomes the California Current which maintains a slow year-round surface flow to the south off Oregon. Superimposed upon this constant southerly current are seasonal currents due to regional weather patterns. During winter, strong low pressure systems and predominant winds and waves from the southwest contribute to a strong northward current called the Davidson Current. During these storm periods, the Davidson Current can displace the California Current away from the coast. During the summer, high pressure systems dominate and waves and winds are commonly from the north. This constant north wind creates a mass transport of water offshore which results in upwelling of bottom water nearshore. In addition, a southerly nearshore surface current, or coastal jet, develops (figure B-8). Winter currents are highly variable with occasional southward flow while summer currents are more uniformly southward. In both seasons there are fluctuations related to local wind, tidal and bathymetric effects.

Ocean Waves and Tides

2.03 Ocean waves are generated by winds. Distant storms produce waves that arrive at the coast as swells which are fairly uniform in height, period and direction. Local winds produce seas which contain a mixture of wave heights, periods and directions. Generally, local seas have higher waves and shorter periods than incoming swell. Waves generated by local winds, i.e., seas, generally approach the coastline from the SW-S sectors during autumn and winter but from the N-NW sectors in spring and summer. The longer period swells generated by more distant storms approach generally from the NW-W or W- SW sectors. Local storms are considered to generate higher waves than swells with the highest waves always occurring during the winter and approaching from the SW-S sectors. Shortest period sea and swell occurs during the summer. Longest period swell generally occurs during autumn while longest period seas occur during winter.

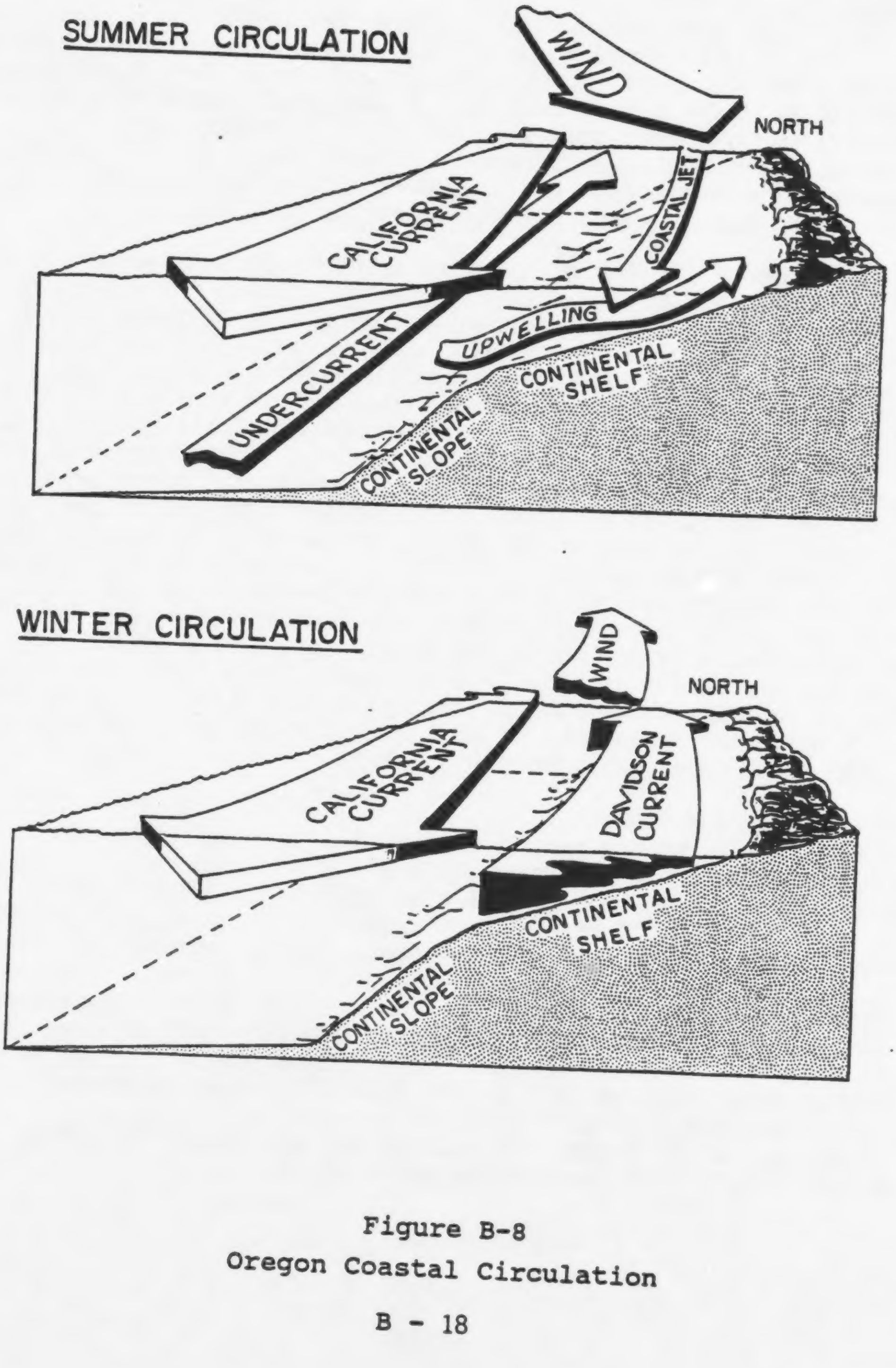

SUMMER CIRCULATION
WIND
NORTH
CALIFORNIA CURRENT
COASTAL JET
UPWELLING
UNDERCURRENT
CONTINENTAL SHELF
CONTINENTAL SLOPE
WINTER CIRCULATION
WIND
NORTH
CALIFORNIA CURRENT
DAVIDSON CURRENT
CONTINENTAL SHELF
CONTINENTAL SLOPE

Figure B-8
Oregon Coastal Circulation

2.04 Figure B-9 compares the long-term variation of significant wave height at Newport with Coquille. Winter mean wave height is estimated at 7.6 feet while summer mean height is 4.1 feet. These figures agree with other estimates and are associated with mean wave periods of 10.3 and 8.4 seconds, respectively. Figure B-9 also illustrates the percentage of time that a given significant wave height can be expected to be exceeded as well as the general recurrence interval. For example, a significant wave height of 10 feet can be expected to occur about 2 percent of the time during the summer but over 20 percent of the time in winter. The maximum significant height that might be expected in any summer is only 14 feet while the maximum expected in any winter is over 20 feet. Figure B-9 shows the variability in annual wave height statistics. The probability of occurrence of significant wave heights for the period 1971-1981 is compared to the probability for the years since 1981. The probability of higher significant waves was greatest in 1982-83 and has decreased back to the ten year probability by 1985. The exceptional wave conditions in 1982-83 were associated with the El Nino event which was also responsible for a sustained rise in sea level and severe beach erosion as discussed by Komar (1986).

2.06 Data recorded offshore of Bandon, Oregon are compared with wave records from offshore at Newport and the wavemeter data in figure B-10. Figure B-10 also compares the 10-year average monthly sea level at Newport with the 1982-83 period and illustrates the daily variability in wave height that can be expected. Also shown are the two periods during which bottom current records were obtained.

2.07 Superimposed upon the slowing-varying regional or seasonal circulation are periodic currents due to the tides, inertial currents, internal waves, etc. Tidal currents are rotary currents that change direction following the period of the tide. Thus, the tidal currents generally flood and ebb twice daily with the flood direction generally east of North and the ebb west of South. Tidal current speeds measured at lightships along the Pacific coast and reported by NOAA (1986) for Coquille were 72 cm/sec at 091 degrees at maximum flood and 61 cm/sec at 290 degrees at maximum ebb.

Local Circulation

2.08 The Coquille ocean disposal site is within 1 to 2 miles of the estuary entrance (figure B-5). Nearshore circulation is highly variable with local bathymetry modifying general ocean circulation patterns and local winds, river discharge and tidal currents all-important. Reports by Hancock et al. (1984), Nelson et al. (1984) and Sollitt et al. (1984) summarize current meter data offshore of Coos Bay between May 1979 and March 1983. These reports substantiate the influence of tides on nearshore bottom currents and winds on surface currents. Bottom current records were found to be dominated by tidal influence with the maximum velocities associated with tides, including spring tide effects. These tidal influences were additive to currents produced by surface waves and winds. One station closest to the estuary was noticeably affected by the ebb current. Figure B-8 illustrates the relative influence of winds and tides on near-surface and bottom currents.

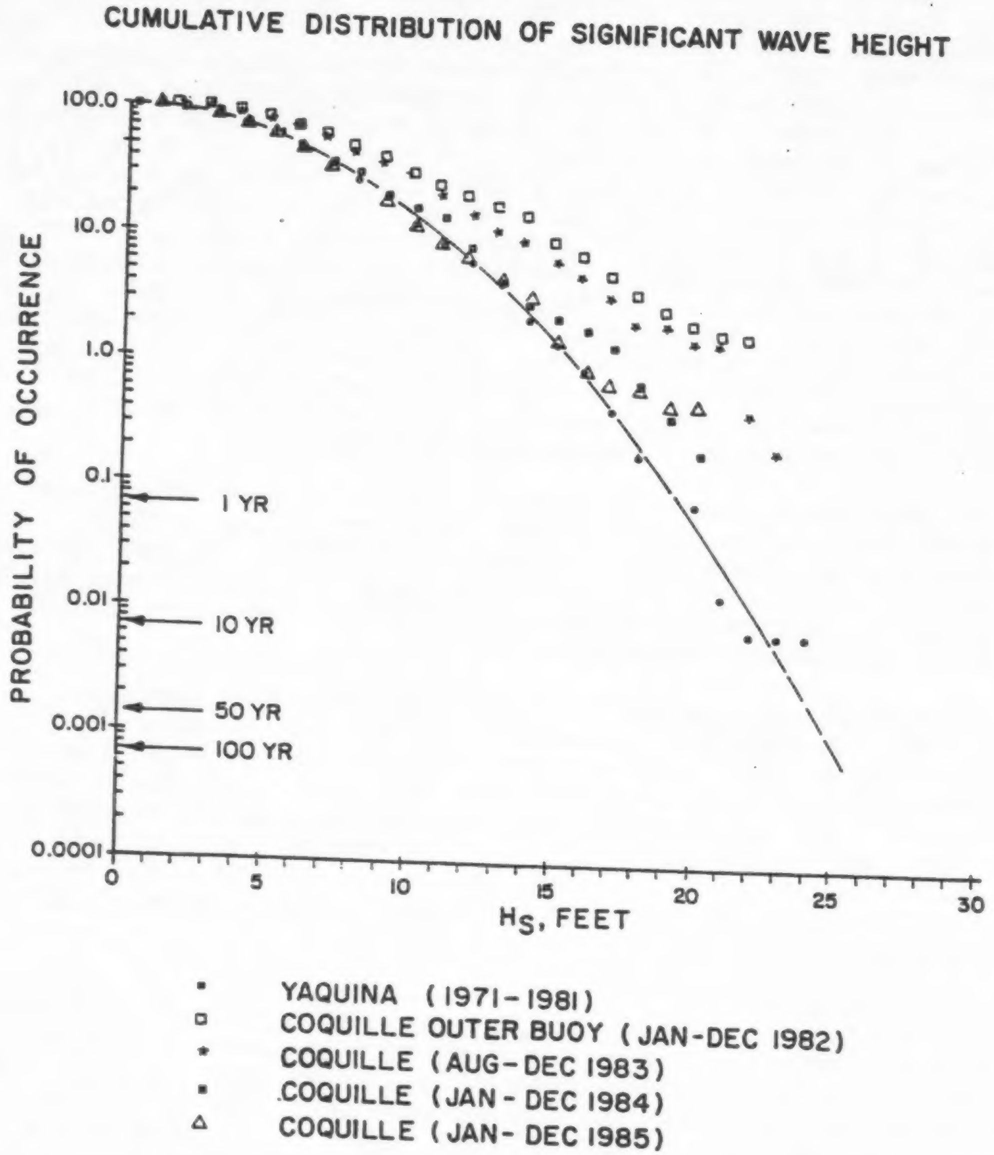


Figure B-9
Seasonal Wave Climate

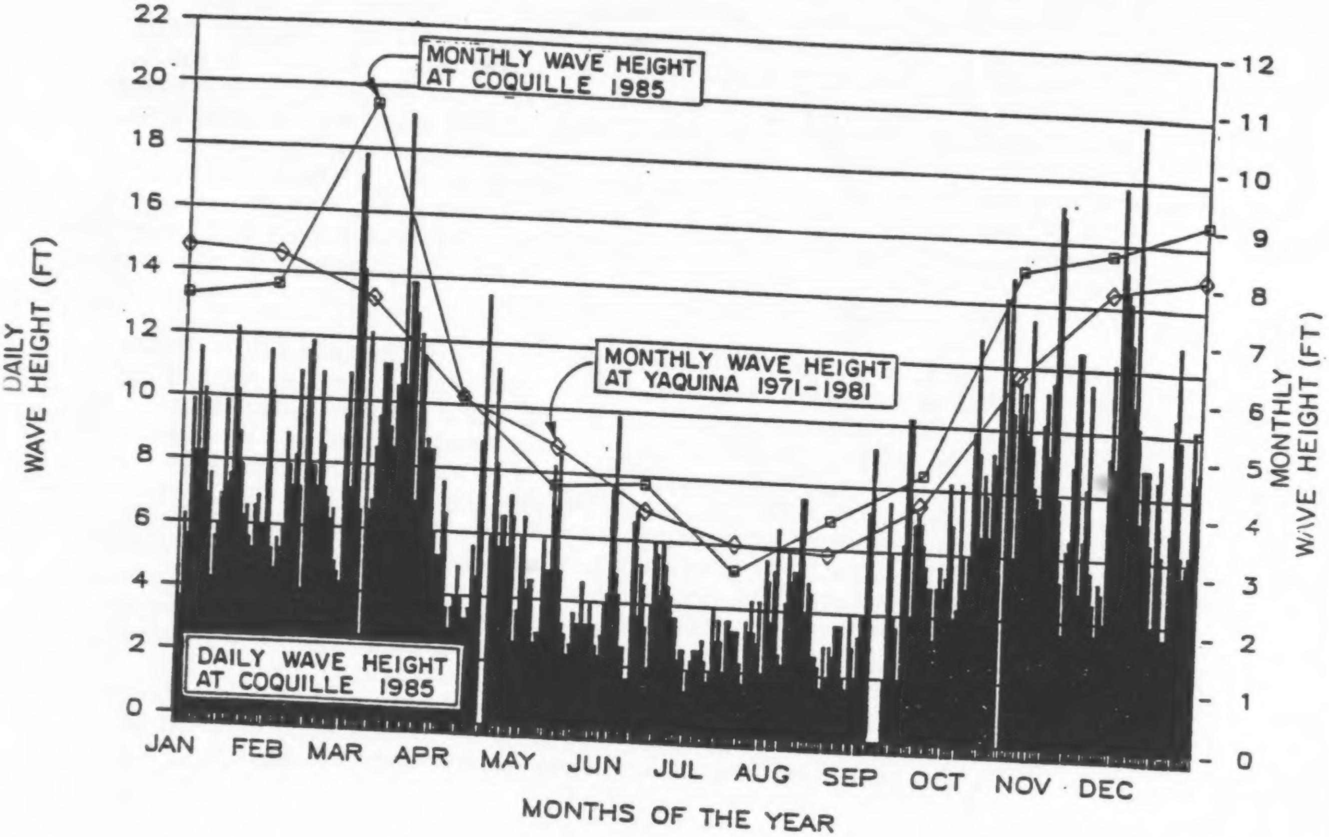


Figure B-10
Coquille Wave Climate

2.09 The seasonal wind regime on the Oregon coast was described by Cooper (1958) and summarized by Bourke (1971) and USNWSC (1970). Summer winds are predominantly onshore from the N-NW. Winter winds are of two types with lower speed offshore winds common, but with frequent strong onshore winds from the S-SW. The summer N-NW winds and winter S-SW winds can be highly variable and influenced by the coastal morphology. Coastal winds can produce both short period waves and direct wind currents. Both of these affect disposal sites. Coastal winds produce surface and subsurface currents directly when relatively constant for several days. Fox and Davis (1974) studied beach and nearshore processes on the Oregon coast in summer 1973. They confirmed that longshore current reversals occurred 2-3 days after reversal of the longshore wind. They also found that nearshore waves correlate with local winds and that the higher the angle of wave approach the stronger the longshore current. Komar (1976) states that direct wind stress from the strong longshore winds on the Oregon coast can have a profound effect on longshore currents. Nelson et al. (1984) compared observed near-surface currents with a wind-driven model for the area offshore of Coos Bay with a good correlation. Hubertz (1986) discusses wind effects on nearshore currents at Duck, N.C. and the tendency to minimize these effects in studying nearshore currents.

2.10 The Coquille River is highly responsive to storm runoff in winter months, resulting in high outflows during coastal storms for periods of several days. Less outflow occurs in summer with minimum flows usually in August and September. This constant but seasonally varying river outflow combines with tidal flows to produce a highly variable influence on the nearshore circulation. In the estuarine part of the river, the ebbing tide adds to the normal river discharge to produce a net ebb dominance. Peterson et al. (1984) use the Hydrographic Ratio (HR) to compare the tidal prism with the river discharge for the same six hour period. The tidal prism is estimated as the volume of water brought into the estuary by each flood tide. The six-hour river discharge is estimated from the annual average discharge. The higher the HR the more tidally-dominated the estuary. Very high HR ratios presumably indicate no river sediment escaping while very low HR ratios would indicate most river sediment is discharged to the ocean. Table B-4 lists important characteristics of the Coquille study area:

Table B-4

Coquille River Hydrographic Ratio

	DRAINAGE BASIN AREA SQ. MILES (A)	ESTUARINE TIDAL PRISM CU. FT. 10*6 (P)	AVE. RIVER DISCHARGE CU. FT./SEC (D)	HR HYDRO RATIO	MAXIMUM DISCHARGE
COQUILLE	1058	132(421)	3,300	2(6)	49000

* Note: HR = P / volume of discharge for a 6 hour period; the numbers in () are from Kreag (1979). The remainder are from Percy et al. (1974) and Johnson (1972).

2.11 More recent work by Peterson et al. (1982) and Peterson (1983) have shown offshore influences of estuaries. Where the river discharge is high compared to the tidal prism (estuary area x tide range) river sediments are discharged to the ocean. As shown by the values in table B-4, the Coquille River probably discharges sediment to the ocean on an annual basis. These effects are probably most evident during winter storm runoff which are coincident with high wave energy offshore. Boggs and Jones (1976) work on the Sixes esturary illustrates the varying influence of tidal and river forces.

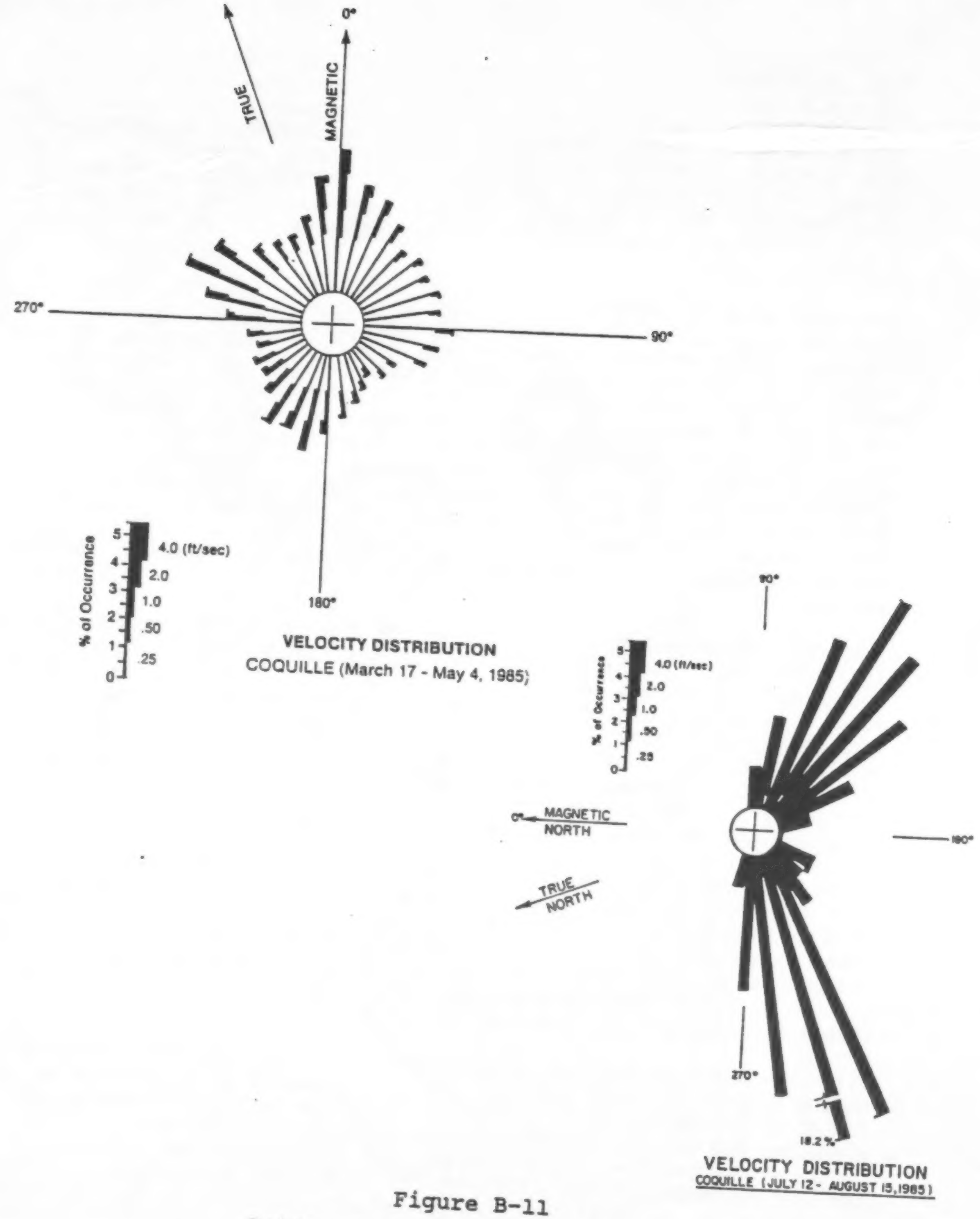
Site Monitoring at Coquille

2.12 Detailed current measurements have been obtained from Oregon nearshore dredge material disposal sites. The most thorough study has been conducted at Coos Bay, Oregon. Seasonal measurements made over two-week periods showed currents at the 25-m-deep disposal site averaged between 20 and 30 cm/s at one-third the water depth during the summer and between 30 and 60 cm/s during the winter and spring. Near-bottom currents were generally between 10 and 20 cm/s with downslope flow components predominating over upslope components. Near-bottom waters exhibited downslope movement to depths in excess of 40 m during the summer and deeper than 70 m during the winter. Similar conditions are expected to exist at the interim Coquille disposal site since both sites are in similar depth regimes.

2.13 Current meters were deployed near the Coquille ocean disposal site in 1985. The meters were attached to moorings at depths from 76 to 90 feet. Bottom current records were obtained from March 17 to March 31 and from July 12 to July 26 in 1985. These periods were picked to represent typical winter and summer conditions. Figure B-11 illustrates the daily average bottom current speed and direction for the winter record. In this current rose, each bar represents the direction the current is moving. The length of the bar represents the percent of occurrence of the current in that direction and the width of the bar represents the range of velocity.

2.14 Wave conditions from onsite monitoring in 1985 were compared with long term wave data for other locations. Figure B-9 illustrates the variability in annual significant wave height. The vertical bars are daily wave heights from a meter offshore of Coquille in 1985 referred to the scale on the left. The Yaquina ten-year monthly average and Coquille monthly average are plotted using the scale on the right. Onsite monitoring data are plotted as points referenced to the scale on the right.

2.15 Wave records near the ocean disposal site were obtained continuously during 1985 by one meter and from March 18-30, April 12-26 and July 12 to August 12 by another meter in 1985. Significant wave heights and periods were computed for the six month period as shown in Figure B-9. Also shown on the figure are the monthly average wave heights computed from records at the port wavemeter between 1971 and 1981. The short period records were analyzed for directional wave spectra as well as the period and significant height. The wave and current data with grain size and depth were used to compute a predicted sediment transport rate and direction for the period.



VELOCITY DISTRIBUTION
COQUILLE (March 17 - May 4, 1985)

VELOCITY DISTRIBUTION
COQUILLE (JULY 12 - AUGUST 15, 1985)

Figure B-11
Bottom Current Data at Coquille

2.16 The picture of nearshore circulation is complicated. Short term records of currents at one location such as obtained in 1985-86 should be used with care. Much additional work is required before such data can be used to predict currents at the same site for other conditions or at different sites. The information presented for each ocean disposal site is intended to represent conditions for a two week period and to show the possibilities for such data to be used to predict sediment transport.

3.0 SEDIMENT TRANSPORT

The Northwest Littoral System

3.01 Introduction. Selection of offshore disposal sites on the Oregon coast must consider the sediment transport regime and disposal effects on the existing local sediment budget. At each dredging project, there is a need to locate offshore disposal sites to balance the need to keep dredged material in the active littoral zone for downdrift beach nourishment with the need to prevent the dredged material from returning to the entrance channel. This requires knowledge about the direction and rate of longshore transport as well as offshore transport. Previous sections have discussed geologic factors and the oceanographic environment which affect sediment transport. This section will discuss this information as it applies to the littoral system and sediment movement at the Coquille disposal site.

3.02 Figure B-12 illustrates the littoral system on the Oregon coast, which consists of interconnected sediment reservoirs such as estuaries, dune fields, beaches and the nearshore bottom. Rivers, sea cliffs, and relict nearshore sand deposits are the primary sources of sediments filling these reservoirs. (Kulm and Byrne, 1966; Scheidegger et al. 1971). Sediment is actively transported between these reservoirs by natural processes including river currents, tidal currents, ocean waves and currents, and winds. Any effort to establish potential effects of estuarine dredging and offshore disposal on nearby beaches and the littoral system must consider the existing sediment budget.

3.03 A seasonal model for sediment transport has been described by Komar et al. (1976) for the Oregon coast where winter storms erode and transport sand offshore and summer swell moves sand onshore. According to this model, the direction of transport reverses seasonally as a result of the change in direction of winds and waves. In winter, the larger, steeper waves erode the beach and carry sediment offshore while the smaller summer waves move sediment back toward the beach. At some distance offshore, net transport is northward year-round (Scheidegger et al. 1985). Hallermeier (1981) defined two zones of sand transport based on wave conditions. The inner littoral zone is the area of significant year-round alongshore and onshore-offshore transport by breaking waves. The outer shoal zone is affected by wave conditions regularly enough to cause significant onshore-offshore transport. Using Hallermeier (1981) and longterm wave data from Newport (Creech, 1981) table B-5 was derived for offshore Oregon.

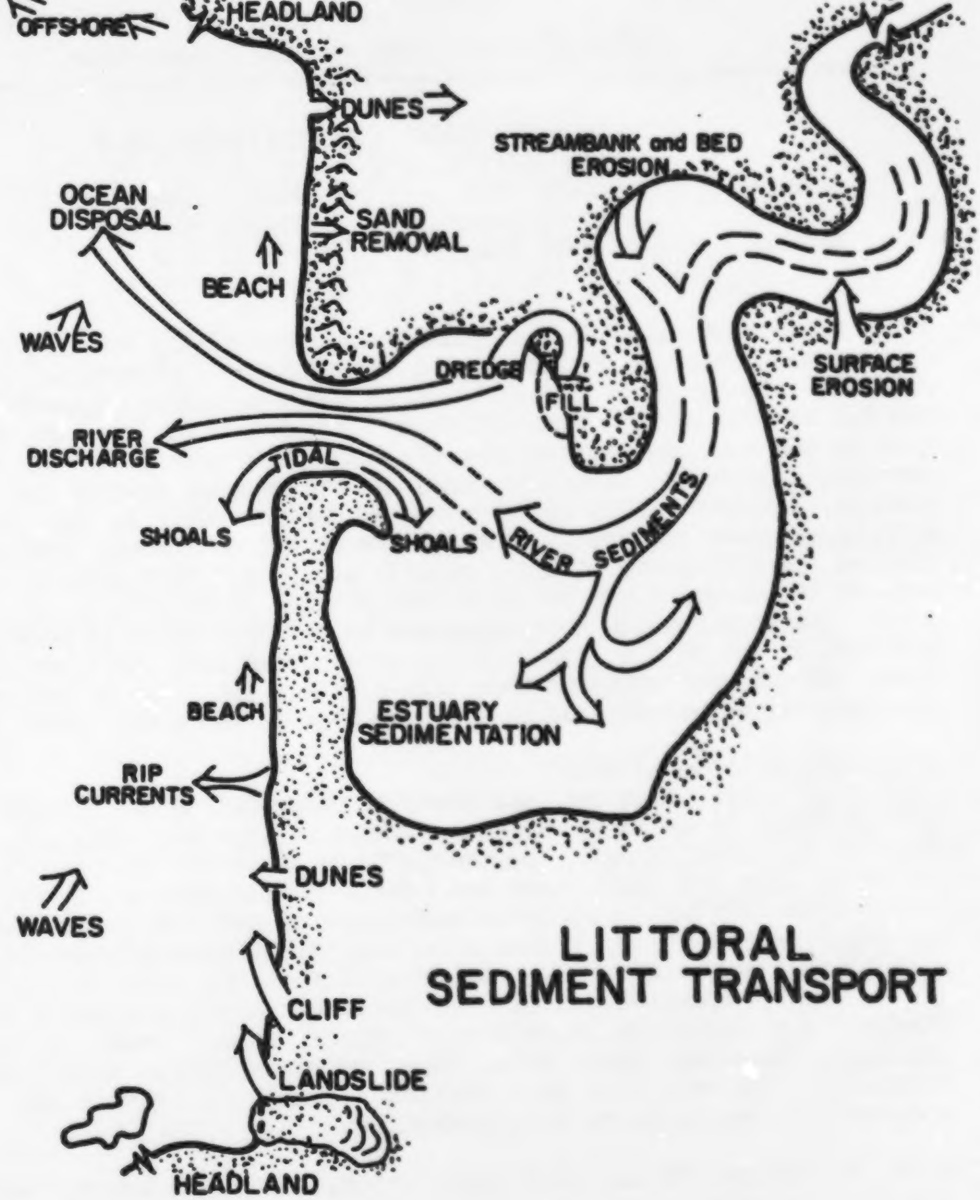

OFFSHORE
HEADLAND
DUNES
STREAMBANK and BED EROSION
OCEAN DISPOSAL
SAND REMOVAL
BEACH
WAVES
DREDGE
FILL
SURFACE EROSION
RIVER DISCHARGE
TIDAL
SHOALS
SHOALS
RIVER SEDIMENTS
BEACH
ESTUARY SEDIMENTATION
RIP CURRENTS
DUNES
WAVES
LITTORAL SEDIMENT TRANSPORT
CLIFF
LANDSLIDE
HEADLAND

Figure B-12
Littoral System

Table B-5

Littoral/Offshore Zones for the Oregon Coast

	LITTORAL(SURF ZONE)	OFFSHORE(SHOAL ZONE)
SUMMER	0-28 feet	28-83 feet
WINTER	0-51 feet	51-268 feet
ANNUAL	0-44 feet	44-142 feet

3.04 Hancock et al. (1984) calculated the probability for wave-induced current velocities at various depths off Coos Bay. From other studies, a critical velocity of 20 cm/sec has been shown necessary to erode sediment in the 0.2 mm sand size, common off Coquille and Coos Bay. Figure B-13 is a plot of the Coos Bay data showing the decreasing probability of sediment movement with depth. There is considerable seasonal scatter but, in general, the probability of wave-induced sand movement is very small beyond a depth of about 150 feet. Another line of evidence comes from sediment studies, including use of heavy mineral analysis. This gives a long term average (hundreds of years) and a less precise definition of the depth limit. Various studies have suggested an offshore limit of modern sand movement at the 60 foot depth, while others push this limit out to over 100 feet. Recent work suggests that this offshore limit can be better defined for specific areas. Work on this is in progress (Peterson, pers. comm).

The Coquille Littoral Cell

3.05 Figure B-1 shows the Cape Arago Littoral Cell which extends north approximately 55 km north from Cape Blanco to Cape Arago and contains the Coquille and Sixes Rivers. Sediments found nearshore are predominantly relict or left over from lower sea levels (Scheidegger et al. 1971). During the past one million years large quantities of sediment originated from as far south as the Klamath Mountains of southern Oregon-northern California and was carried north by the prevailing littoral currents (Scheidegger et al. 1971). The mineralogies of these sediments and modern beach sands are similar, indicating the importance of relict littoral sands to the nearshore and beach (Peterson, pers. comm. Based on comparison of tidal and river discharge it appears that both the Coquille and Sixes Rivers are contributing sediments to the littoral cell.

3.06 Within the overall Cape Arago Littoral Cell is a subcell marked by the seaward submerged extension of Coquille Point. Within this subcell, the possible sources of sediment are the Coquille River and parts of the coastal terraces. There are indications that there is no longshore transport into the cell from south of Coquille Point and the probable limit for onshore transport is about -80 feet. Based on estimates by Karlin (1980) of sediment yields for the Coquille River, approximately 17-51,000 cubic yards of bedload material could be annually contributed to this littoral subcell by the Coquille River. Rocky seacliffs are present only at Coquille Point

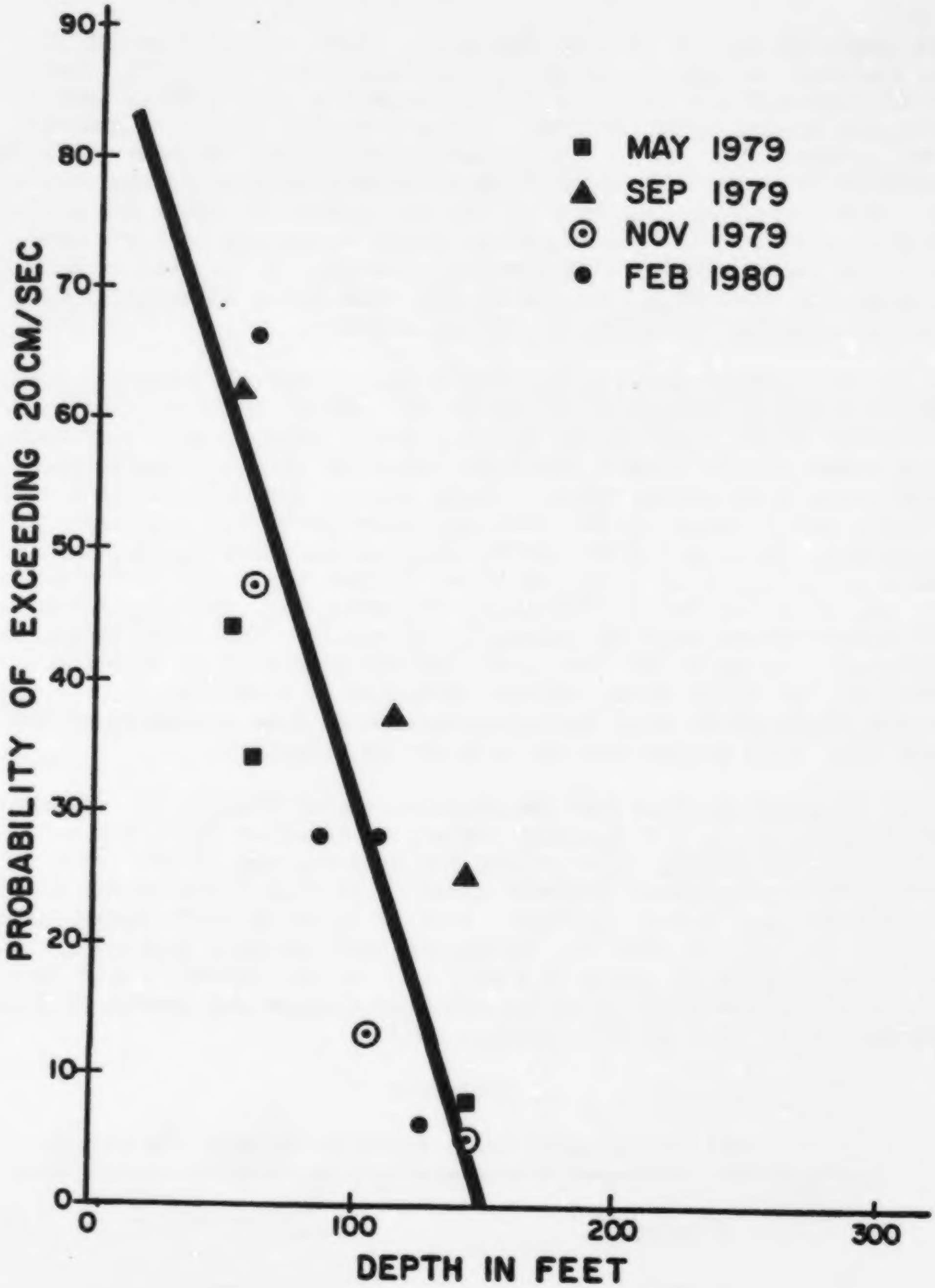


Figure B-13
Depth of Sediment Movement

and probably provide minimal sediment. There are indications that little or no sediment is bypassed at either headland (Peterson, pers. comm.) which could indicate that any sand moved around the headlands is lost to the offshore beyond about -80 feet. Other possible losses of sediment within the littoral cell are to the estuaries and dunes. Neither the Sixes or Coquille Rivers are considered to be accumulating sediments, however, there is intrusion of marine sands during low riverflow. There are active dune fields north of the Coquille River mouth, which may indicate some loss of littoral sand. There is no systematic mining of littoral or dune sands at present but some or all of the 60,000 cubic yards annually dredged from the entrance channel is probably carried offshore.

3.07 More recent work by Peterson et al. (1982) and Peterson (1983) have shown offshore influences of estuaries. Where the river discharge is high compared to the tidal prism (estuary area x tide range) river sediments are discharged to the ocean. The Coquille River probably discharges sediment to the ocean on an annual basis. These effects are probably most evident during winter storm runoff which are coincident with high wave energy offshore. Boggs and Jones (1976) work on the Sixes estuary illustrates the varying influence of tidal and river forces. The Coquille has a similar HR to the Sixes and both are strongly influenced by river discharge, especially in winter months when net transport is seaward under high riverflow. By contrast, during summer low riverflow net transport is into the estuary. However, the Sixes shows and net bypassing of sand-size sediments into the ocean little or no long term accumulation of fine sediments in the estuary and net. This should also be true of the Coquille.

3.08 Figure B-6 shows how the sediment covers changes in thickness and continuity in the 25F possibly reflecting Coquille River input. By comparing subsurface profiles and the geologic map we can infer that the thin and discontinuous sediment cover of Profile 1 represents an area with little sediment being supplied. Profile 2, while still rocky, shows thick levees of sediment possibly indicating some sediment supplied, while further north on Profile 3, there is a more continuous sediment layer over 25 feet thick. Table B-6 identifies the possible sources and losses of littoral sediments in the Coquille littoral cell:

Table B-6

Coquille Littoral Cell: Possible Sources and Losses

SOURCES	LOSSES
1. Rivers Coquille Sixes	1. Estuaries
2. Erosion Dunes Terraces	2. Dune Growth
3. Headland Bypassing	3. Headland Bypassing
4. Onshore Transport	4. Offshore Transport
	5. Ocean Disposal Seacliffs

Coquille Sediment Transport

3.09 Figure B-14 is a generalized description of seasonal sediment transport in the Coquille ZSF using available information. The bathymetry and sediments are complex offshore which influences any general predictions. From both Hallermeier (1981) and observed currents and sediment mineralogy, the zone of active bottom sediment movement probably extends to almost -80 feet. The area where longshore currents predominate is shoreward of about -50 feet. The summer current records indicate southerly transport withboth onshore and offshore components. During the summer the Coquille River discharge is at a minimum indicating intrusion of marine sand into the estuary. There may be some accumulation of sand in the nearshore next to the north jetty and between the south jetty and Coquille Point. There is no long term sediment accumulation as indicated by the thinness of the sediment layer. During the winter there is a discharge of river sediment. The coarser sediments just south of the jetties may be an accumulation of river material. The majority of the more mobile sand moves offshore and to the north. The submerged extension of Coquille Point seems to effectively block any sediment movement from further south in the littoral cell.

Ocean Disposal Site

3.10 The majority of the existing disposal site is rocky with a very thin layer of sand. An area of sand inshore of the site may actually be where previous dredged material was disposed or an accumulation of winter river sediment discharge. The bottomfeatures and bathymetry of the proposed site are more compatible with the type of historic disposal operation. The average 60,000 cubic yards of dredged sand compares to from 17-51,000 cubic yards of river bedload annually contributed to the area. Use of the proposed site would probably not affect the overall littoral sediment budget. By moving the site northward, however, the use of the shallow end of the site in early summer might allow material to be transported back toward the entrance channel. For this reason, it is recommended that use of the proposed site be contingent upon preparation of a disposal monitoring plan.

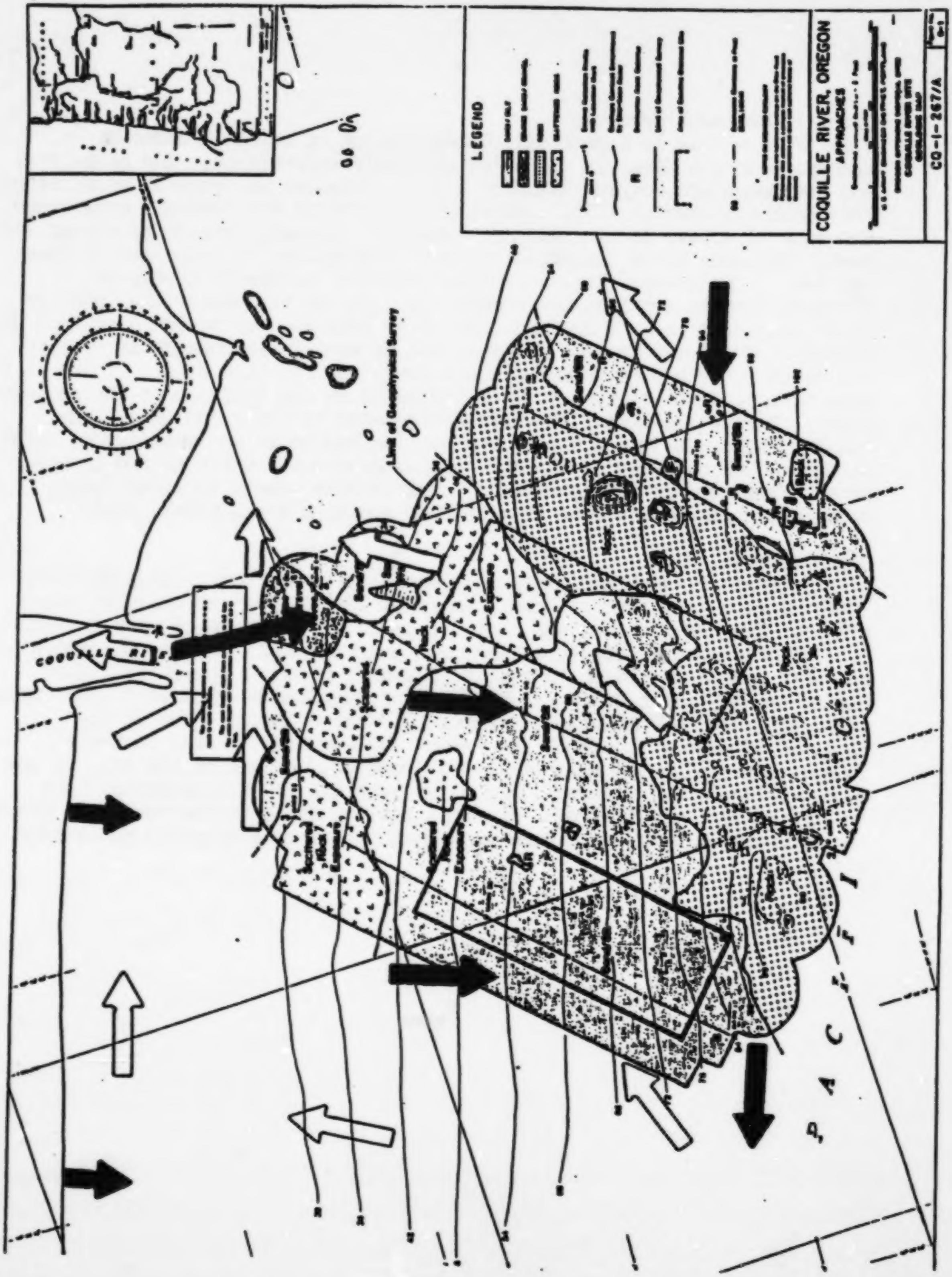

LEGEND
COQUILLE RIVER, OREGON
APPROACHES
CO-I-267/A
Limit of Geophysical Survey
COQUILLE RI
PACIFIC

Figure B - 14.
Coquille Sediment Transport.

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APPENDIX C

SEDIMENT CHEMISTRY
AND WATER QUALITY

APPENDIX C

SEDIMENT CHEMISTRY AND WATER QUALITY

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APPENDIX C

SEDIMENT CHEMISTRY AND WATER QUALITY

General

1.01 General criterion (b) and specific factors 4, 9, and 10 of 40 CFR 228.5 and 228.6 require sediment and water quality analysis of both the disposal and dredging areas. Sediment samples from the channel of the Coquille federal navigation project were collected by the Portland District, Corps of Engineers in February, 1981. The Coquille offshore disposal site was sampled in July, 1985. Locations of the sampling stations are shown in figure C-1.

Grain Size

1.02 The grain size distribution curves for Coquille channel sediments show poorly-sorted sand with increasing gravel downstream towards the bar at about RM 0.0 (figure C-2). Disposal site sediments ranged from poorly-sorted gravelly sand to well-sorted fine sand (figures C-3 & C-4). Thus, the grain size of the dredged sediment closely approximates that at the disposal site.

Physical Analysis

1.03 The percentages of volatile solids in channel sediments were all less than 1.5% (table C-1).

Table C-1

Sediment Characteristics

Sample #	Location	Median Grain Size (mm)	% Volatile Solids
1	RM 00 + 00	0.28	0.54
2	1000' W. of Lighthouse	0.24	0.84
3	1000' E. of Lighthouse	0.20	1.48
4	RM 1.0 (Moore Lumber Dock)	0.45	0.63
5	RM 1.2	0.45	0.70

This was less than values at the disposal site, where volatile solids ranged between 0.8 to 2.9% with one exception. Sample site Q-53 at the 50-foot depth level had a reading of 12.3% volatile solids. This seems unusually high for well-sorted fine sand away from the disposal site, especially since surrounding sites show values under 1.5%. Thus, the 12.3% anomaly seems to be a spurious value and probably does not indicate a pollution problem.

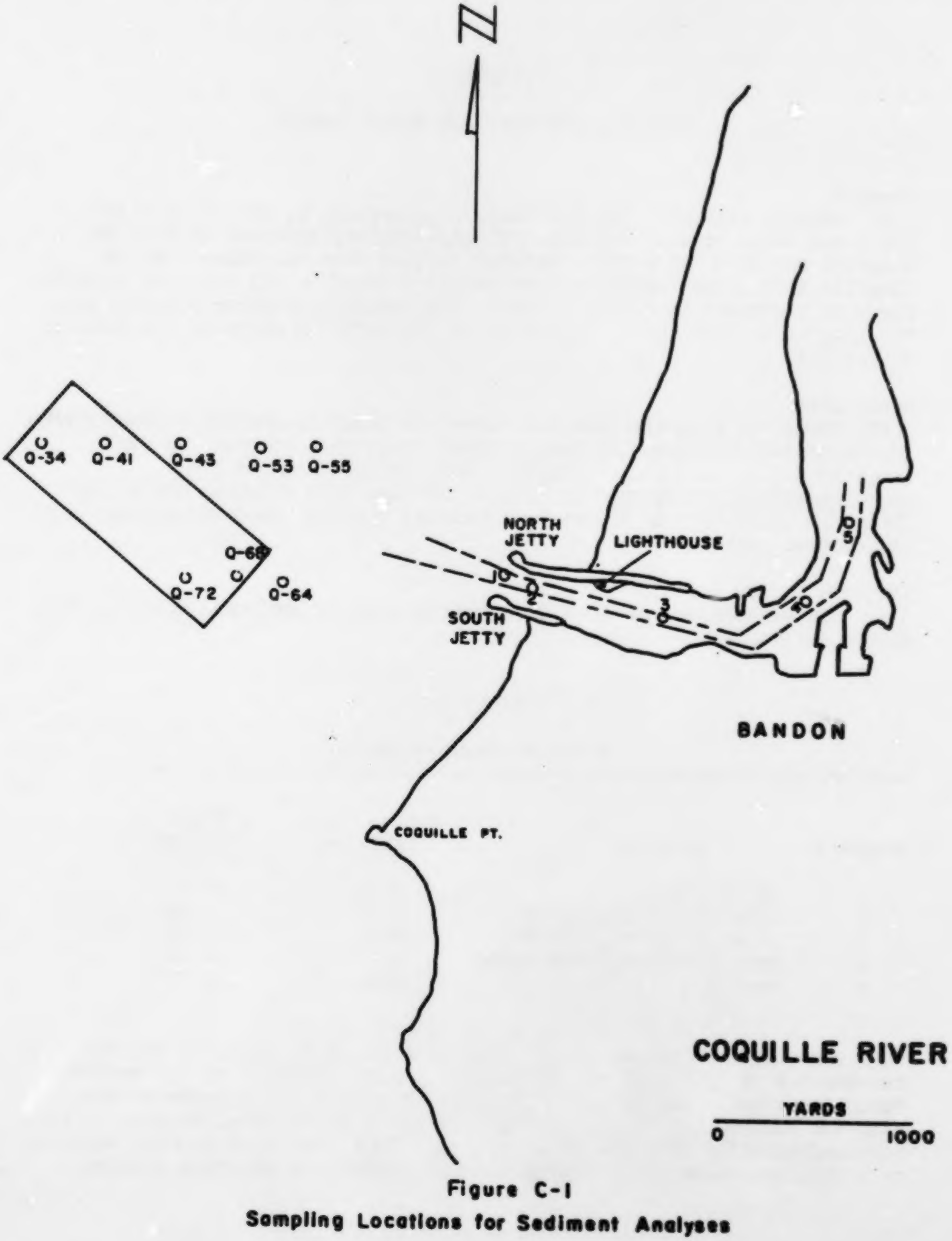
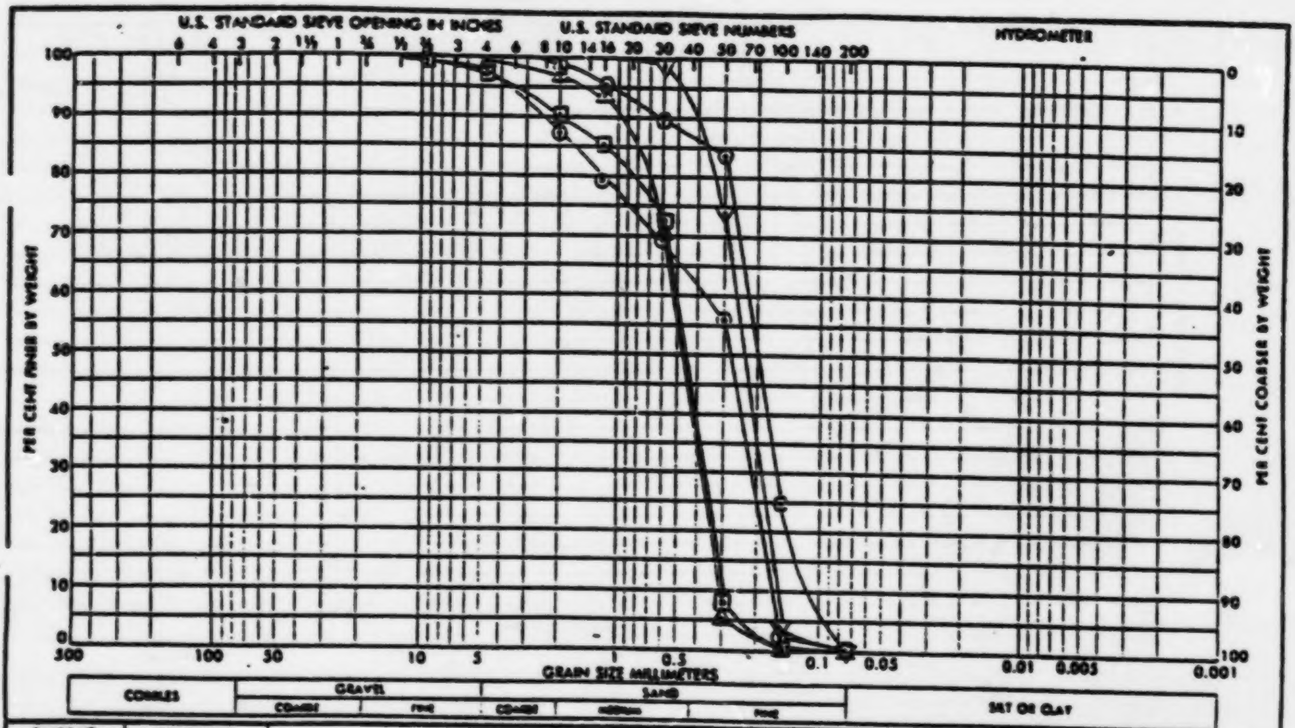

N
Q-34
Q-41
Q-43
Q-53
Q-55
Q-68
Q-72
Q-64
NORTH JETTY
LIGHTHOUSE
SOUTH JETTY
1
2
3
4
5
BANDON
COQUILLE PT.
COQUILLE RIVER
YARDS
0
1000

Figure C-1
Sampling Locations for Sediment Analyses



	SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
○	RM 00 + 00		SAND (SP)				
△	RM 1.0 Moore Lumber Dock		SAND (SP)				
□	RM 1.2		SAND (SP)				
▽	1000' West of Lighthouse		SAND (SP)				
○	1000' East of Lighthouse		SAND (SP)				

GRADATION CURVES

NPD

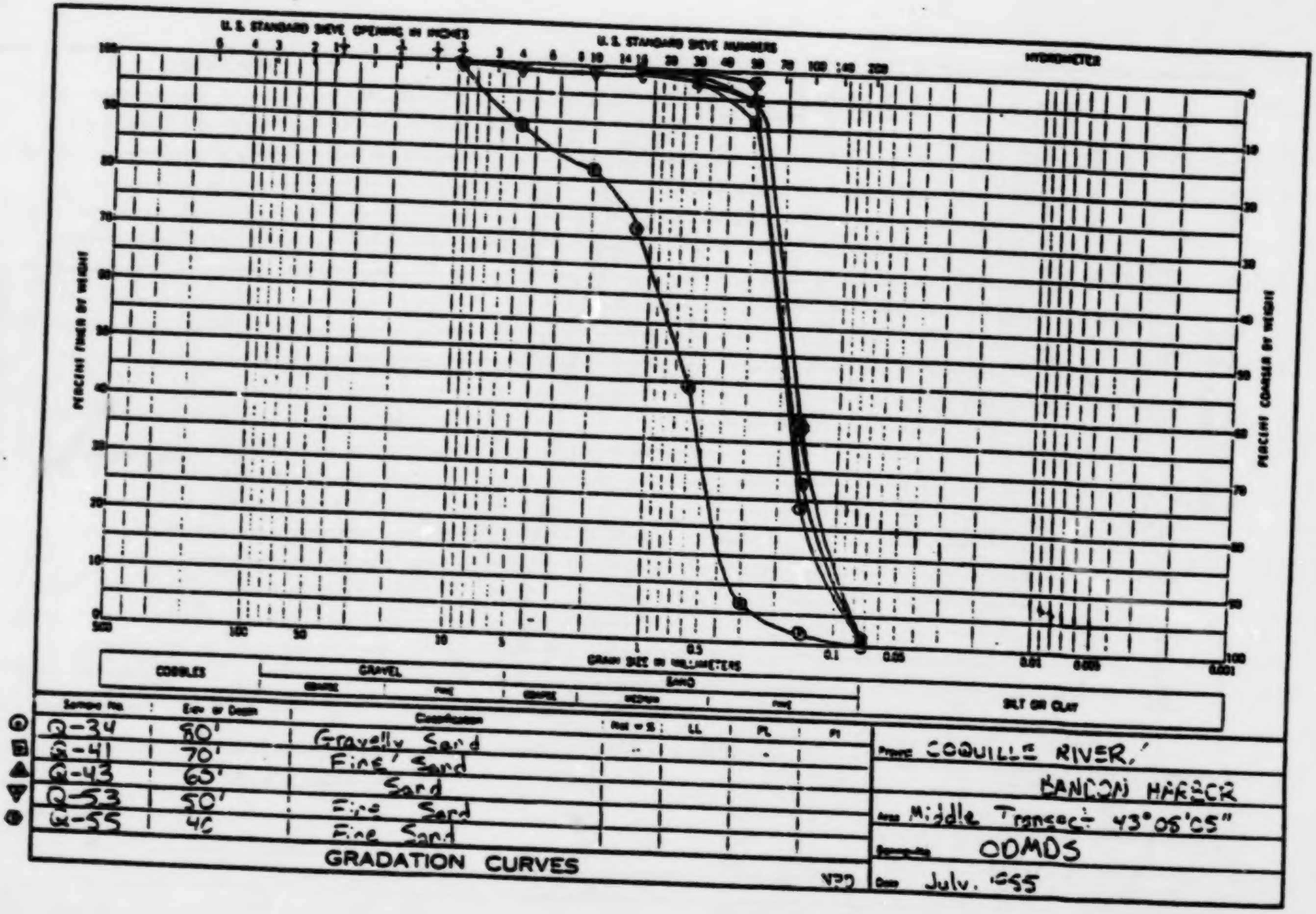
PROJECT RIVER/COASTAL SEDIMENT ANALYSIS

AREA Coquille River

BORING NO

DATE 18 Feb 81 (81-S-816)

Figure C-2
Grain Size Curves for Coquille Estuary

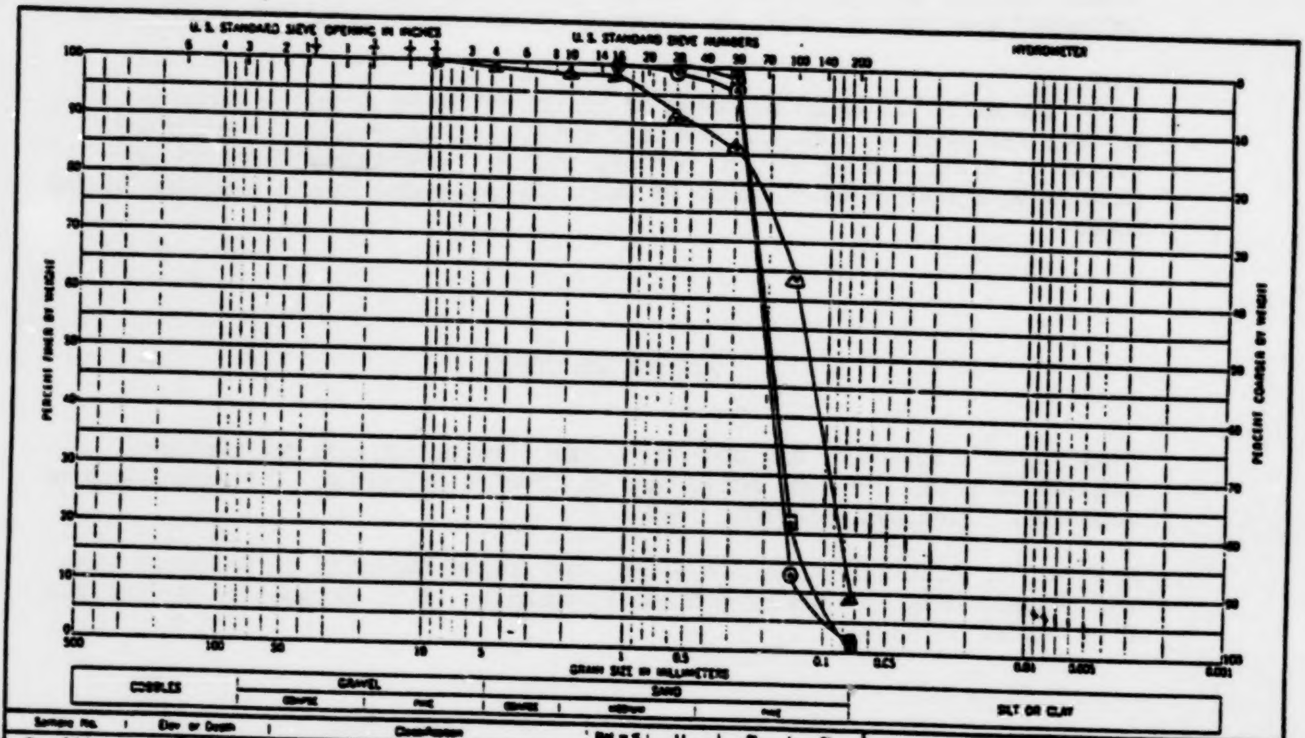


Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
⊙ Q-34	80'	Gravelly Sand	--		.	
⊡ Q-41	70'	Fine' Sand				
▲ Q-43	65'	Sand				
▼ Q-53	50'	Fine Sand				
● Q-55	40	Fine Sand				

GRADATION CURVES

Project COQUILLE RIVER,' BANDON HARBOR
Area Middle Transect 43°05'05"
Boring No. ODMDS
Date July, 1955

Figure C-3
Grain Size Curves for Disposal Site, Middle Transect



	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
⊙	G-64	35'	Fine Sand (SP)	-		-	
⊡	G-68	40'	Fine Sand SP				
△	G-72	55'	Poorly-graded Sand (SP)				

Project COQUILLE RIVER / BANDON HARBOR
Area South Transect 43°07'25"
Boring No. ODMDS
Date July, 1995

GRADATION CURVES NPD

Figure C-4
Grain Size Curves for Disposal Site, South Transect

Chemical Analysis

1.04 No chemical analysis of Coquille sediments has been done. Limited chemical analyses have been performed on other estuarine sediments in Oregon (USGS). However, there is no reason to expect significant chemical contamination as few heavy industries are located along the estuary. There is commercial fishing, fish processing, and three lumbermills—including the Moore Mill at River Mile 1.3. These mills have been operating intermittently during the last several years and they do not seem to have increased the organic load, as measured by the volatile solids (table C-1).

Summary

1.05 The material to be disposed of in the ODMDS at Coquille closely matches the sediments at the disposal site, does not have a significant amount of silt, and is low in volatile solids. There should not be any problem with continued disposal of Coquille entrance channel sediment at the ODMDS.

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APPENDIX D

RECREATIONAL USE

APPENDIX D

RECREATIONAL USE

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APPENDIX D

RECREATIONAL USE

Recreational Use Areas

1.01 Figure D-1 identifies the major recreational use areas within the ZSF. The area receives recreational use year-round with the most popular months being from May through September. Primary activities include fishing, camping, beachcombing, sightseeing and picnicking.

1.02 Beginning at the north jetty and extending north along the coast for several miles is Bullards Beach State Park. Recreational attractions include a campground, picnic areas, boat launch, horseback riding, hiking, beachcombing and clamming. The Coquille Lighthouse parking lot is the only development located within the northern half of the ZSF. This area has been subject to damage from ocean hydrology and storm activity. State Park personnel are considering moving the lighthouse parking lot behind the foredune where conditions are more stable.

1.03 Another state park located within the ZSF is the Bandon Ocean Wayside. This is a 15-acre park located along the coast approximately 1 mile south of the Bandon city center. Bandon Wayside offers park visitors sightseeing and photographic opportunities of the offshore rock outcroppings and Oregon Island National Wildlife Refuge. The wayside provides access to the beach where beachcombing is a popular activity at low tides. The viewpoint area is heavily used by visitors during the summer months. Existing facilities include a parking lot and viewing area.

1.04 The Coquille River jetties are small, which restricts their use during periods of rough weather. Despite this limitation, the area is popular for its bottom fishing opportunities. Fishing pressure is heaviest from June through August when surf conditions are less threatening and more predictable.

1.05 The offshore fishery is for both rockfish and salmon. The most popular and productive area is offshore of Coquille Point. This is also a very scenic area because of the rocky headlands and offshore sea stacks.

Impacts of Disposal Operations

1.06 The proposed disposal site identified in figure D-1 is located outside of any major recreational use areas. As a result, few conflicts are expected to ccur between recreationists and disposal operations. Any conflicts that may arise would occur as the vessel was in route to the disposal site. These conflicts could include time delays for recreational boaters caused by the passing of the dredge or an increase in navigation hazards during congested periods. Conflicts such as these can be considered an inconvenience rather than a threat to recreational activity. The only serious threat is the potential for collision between recreational boaters and dredge traffic. Confrontations of this nature are rare due to the slow speed at which the dredge moves. Unless there is a significant change in

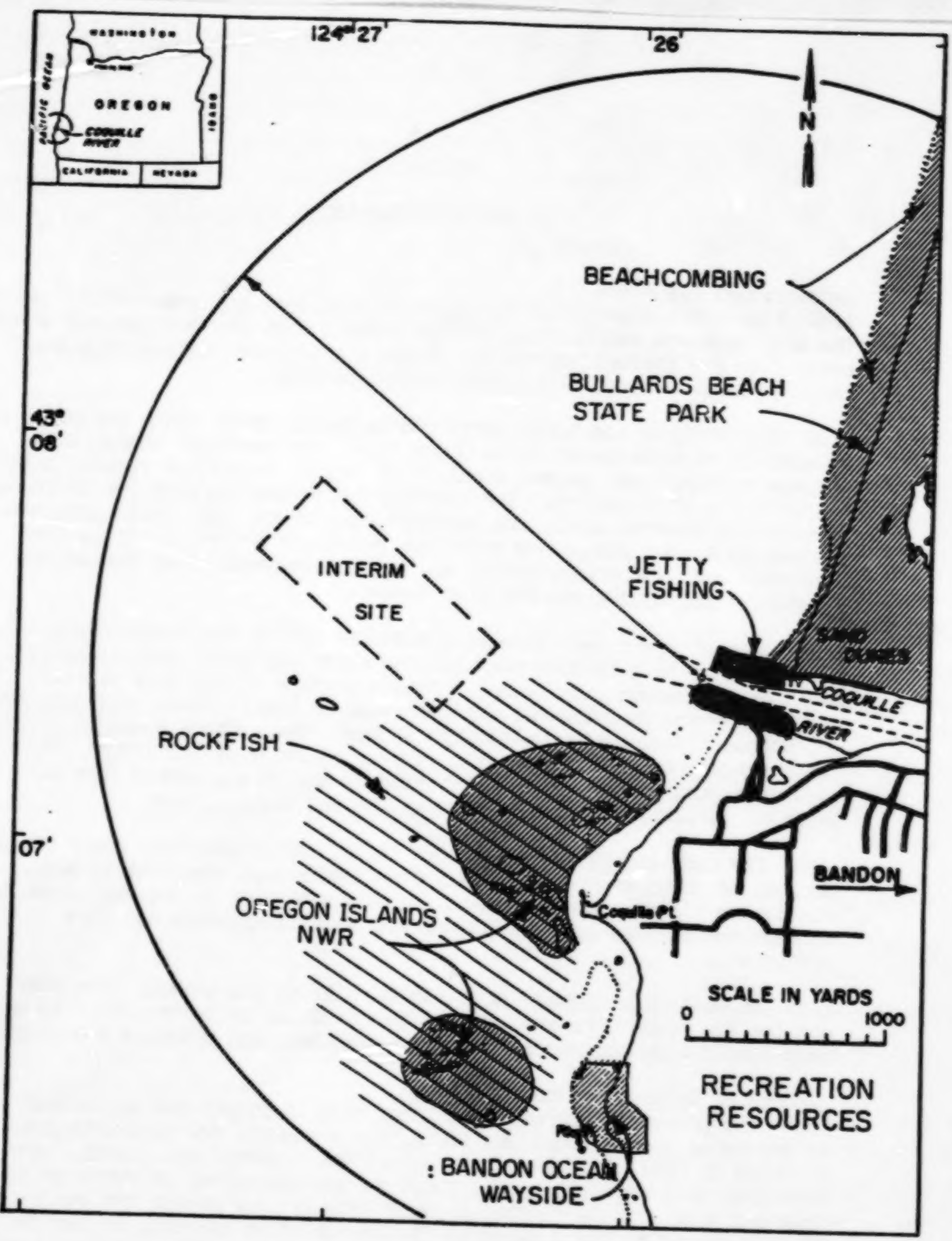
WASHINGTON
OREGON
PACIFIC OCEAN
IDAHO
COQUILLE RIVER
CALIFORNIA
NEVADA
124° 27'
26'
N
BEACHCOMBING
BULLARDS BEACH
STATE PARK
43°
08'
07'
INTERIM
SITE
JETTY
FISHING
SAND DUNES
COQUILLE
RIVER
ROCKFISH
BANDON
Coquille Pt.
OREGON ISLANDS
NWR
SCALE IN YARDS
0
1000
RECREATION
RESOURCES
BANDON OCEAN
WAYSIDE

Figure D-1
Recreation Resources

equipment or operational procedures, the potential for collision will remain low.

1.07 When dredged material is deposited at the disposal site, the surrounding water conditions will deteriorate. This condition will result in a reduced visual quality of the area and possibly disrupt the feeding patterns of sport fish. Both of these situations would be temporary and normal conditions would return as soon as the sediment had settled.

1.08 Sediment deposition along the beach is another possible consequence of disposal operations that could affect recreational activity. The accumulation of dredged material on the beaches could potentially interfere with the free movement of sand, which may affect the vegetative cover or modify the landscape topography. If the slope of the beach is altered significantly, it could interfere with the accumulation of driftwood and other items of interest to beachcombers. A change in slope could also affect local clam beds. These changes would result in reduced recreational opportunities for the area. Another potential problem with beach nourishment is the accumulation of foreign material on the beaches. If the dredged material has a different color or texture than the existing material, the results could be a reduction in the visual quality of the area.

Conclusions

1.09 Use of the proposed disposal site should have little impact on existing recreation. During disposal operations, water conditions would deteriorate. Any impact this may have on sport angling or visual quality of the area would only be temporary. Some inconveniences would be experienced by recreational boaters and fishermen; but overall, disposal operations appear to pose no serious threat to recreation.

1.10 If future studies indicate that disposal operations are either detrimental to ocean fauna, found to be disrupting sediment deposition along the coastline, or are responsible for any long term water quality problems, further information should be collected to determine more specifically what extent these impacts would have on recreation. Until any of these impacts are observed, future disposal of dredged material at the present site is not expected to have any substantial effects on recreation.

APPENDIX E

CULTURAL RESOURCES

APPENDIX E

CULTURAL RESOURCES

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APPENDIX E

CULTURAL RESOURCES

Introduction

1.01 Research and analysis of the relevant historical records and the preservation context indicate that the most likely cultural resource within the project area are shipwrecks. A review of environmental changes since the first colonization of the North American continent, and the rise in sea level and subsequent erosion of former ground surfaces, suggests that the preservation context has been substantially degraded and that early prehistoric sites would not have survived. There are, however, examples of archeological sites in areas inundated by the sea, indicating that the problems of submerged early prehistory cannot be entirely dismissed. Moreover, recent cultural resources are unlikely because no new land forms have been exposed or developed since the present sea level was established 6,000 years ago. Other than perhaps the lost or discarded elements of fishing gear used in an offshore fishery, there is little possibility that prehistoric sites more recent than 6,000 years ago are present within the study areas.

1.02 The following portion of this appendix is an overview of the basic archeological issues and provides background for each of the study areas discussed more fully below.

Early Prehistoric Sites

1.03 Many important archeological issues have yet to be resolved. Among these is the major research question concerning the initial colonization of the North American continent. Although there is little consensus on the time of arrival, archeological opinion holds that the first colonists (the forerunners of today's Native Americans) migrated across the Bering Straight from Asia to North America on a land mass that was exposed in a low sea cycle during the Wisconsinan ice age in the late Pleistocene.(1) The dates of these migrations vary, ranging from as early as 75,000 to 60,000 years ago during the Middle Wisconsinan to the more recent late Wisconsinan glaciation of 20,000 to 12,000 years ago.(2)

1.04 There are significant archeological issues associated with a lower sea level. During periods when the sea stood at a lower level, a broader, more extensive coastal plain was present. Baldwin, for example, notes that the principal valley mouths along the Oregon coastline have been drowned by rising sea levels.(3) If prehistoric people migrated down the coast they would have followed a beach line that is now inundated by current ocean levels.(4)

1.05 A number of studies have been made which correlate ocean depths with the time periods when these areas were exposed ground surfaces. These studies, based on the analysis of submerged beach and strand lines, and in some cases supported by radiocarbon dates, have established a generalized scale correlating decreases in ocean depths (as water was taken up and frozen in continental glaciers) with the time these events occurred.(5,6,7) Figure E-1 approximates this information.

1.06 For the purposes of this paper, the graph focuses on potential areas where early prehistoric sites might be located. It does not prove or demonstrate the presence of any sites. In fact, though archeological sites have been found in areas inundated by the ocean, their age range tends to cluster around more recent times rather than the glacial periods.

1.07 For example, a major archeological deposit has been located along the California coastline. The artifacts which compose the site indicate a substantial settled Indian occupation with an emphasis on seed processing. The artifact styles indicate a site at least 7,000 years old—if not older. Artifacts have been found to depths of 100 feet. Though the site's geomorphology has not been totally worked out one interpretation suggests that, "As sea level rose it built up a series of barrier beaches fronting the lagoon and the inhabitants settled on or at least lived near these beaches. The rising sea level forced the progressive abandonment of these sites and in each case left a sheet of artifact material on the near shore bottom extending offshore from the present beach to the 30 or 40 foot curve."(8)

1.08 Another site along the California coastline is thought to be 3,000 to 5,000 years old based on artifact styles. This site is in 15 to 25 feet of water. Estimating the age of the site with the time-depth graph supports the typological age of the site. The site may be an example of a lowland setting that was one of the last surfaces covered by a rising sea. The significance of this site in contrast to the preceeding example is the fact that it is a primary uneroded deposit. As an uneroded site it indicates that an archeological site can survive inundation and near shore currents if it is located in a buffered or sheltered setting.(9)

1.09 Key components used in analyzing the disposal sites under evaluation are site depth, topographic features that might lend themselves to buffering an archeological site from wave energy, and sediment type which may indicate a stable long term geological setting.

1.10 Prehistoric cultural resources more recent than 6,000 years ago are unlikely in the project area. Though implements used to procure marine resources during subsistence activities may be present, the presence of archeological sites is very unlikely. Since 6,000 years ago, the project area, (especially the disposal sites) has been covered by the ocean. Appropriate environments suitable for human habitation have not been present.

Historical Cultural Resources

1.11 The most probable cultural resources and the ones most likely to survive conditions of the project area are shipwrecks. Ocean-going ships and vessels of the coastal trade played a fundamental role in the Northwest.(10) Sailing vessels accomplished the first explorations along the Oregon coast. Sail-powered vessels moved goods and people during the early fur trade and initial settlement. As settlement expanded and

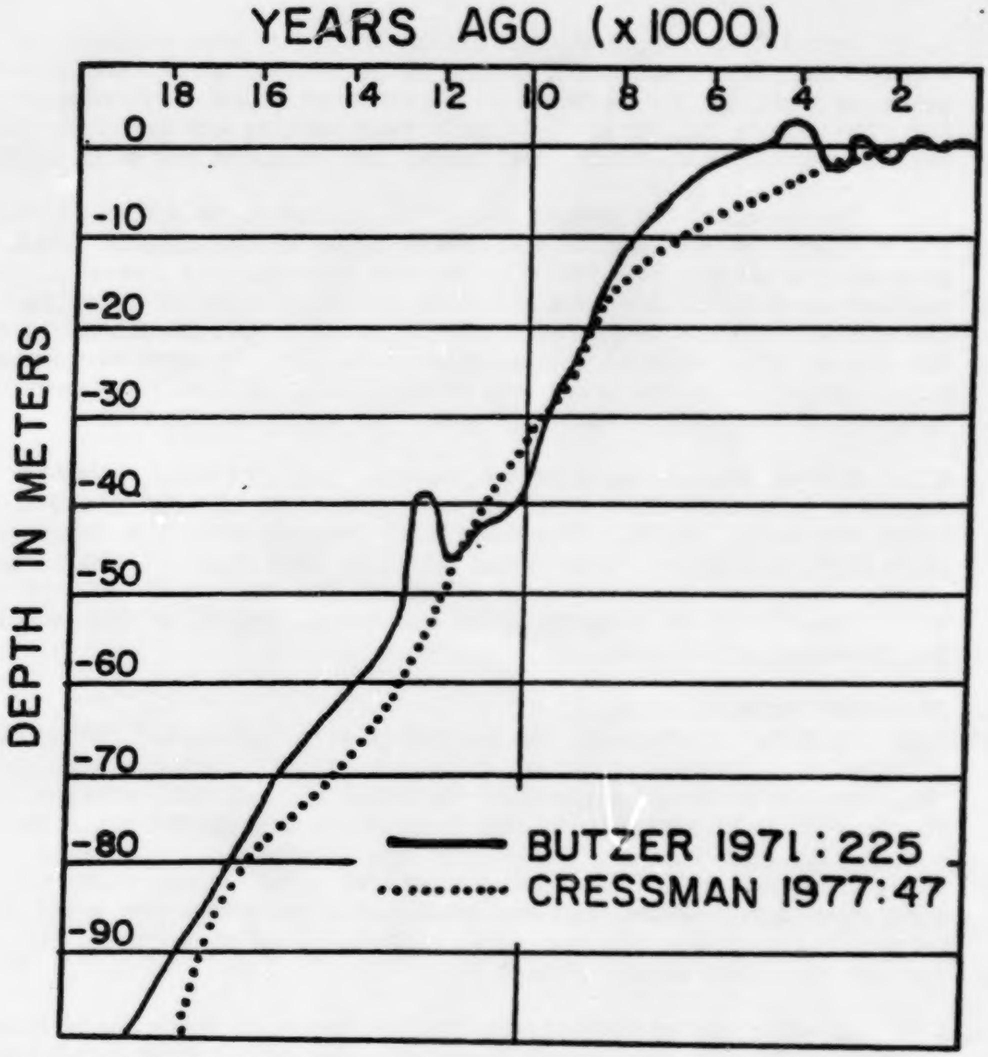

Figure E-1
Time-Depth Correlations

commercial development increased in the Oregon Territory, mechanically-powered vessels came into use. Though some vessels of all types were lost, the economy and reliability of sea transportation outweighed the occassional loss of a vessel, crew, and cargo.(11)

1.12 Vessels were wrecked with enough frequency that remnants of a substantial number are still likely to be present along coastal areas. When taken as a group, the remnants of these vessels probably constitute an important study collection. Vessels representing the broad range of types used in exploration, trade, and commercial ventures may be present.

1.13 For example, the sample should be dominated by schooners engaged in the historic development of the lumber industry and coastal trade from the late 1850's through the 1920's. Vessels transporting lumber to the California markets constituted a substantial portion of this trade.(12) As the timber industry developed in the coastal range, Oregon ports also became the center of a regional shipbuilding industry. In many circumstances, the major lumber mills had their own shipbuilding facilities or provided the industrial base that supported local ship construction.(13)

1.14 Exotic vessels may also be present. For instance, numerous derelict Japanese junks have been reported grounded along the Pacific Northwest coast since the early 1800's. These vessels, damaged along the Japanese coastline, drifted on major ocean currents from Japan to the Northwest coast. They have been reported as far as the west coast of Mexico.(14) These vessels may be present along the coast, depending upon local preservation conditions.

Shipwreck Location Model

1.15 In order to evaluate the potential of a particular project area for shipwrecks, a general model of shipwreck distribution was developed. Using the location of known shipwrecks the model assumes that similar conditions in the past will account for the location of unrecorded wreck sites. This information was then used to project the likely zones for wreck sites. For the purposes of this study the projections were used to rank the project area into high, medium, and low probability locations for wreck sites, mapped on particular project maps, and then used to minimize project impacts to likely areas (figure E-2).

1.16 In addition to identifying the locations of wreck sites based on a literature search, the actual disposal sites were investigated using a side scan sonar survey. Though side scan sonar surveys have been questioned (15), the results of the survey for the ODMDS projects tend to support its reliability within the limits of the project areas. For example, the sonar surveys at the mouth of the Columbia River picked out numerous wreck signatures and topographic features on the sea floor that indicate buried wrecks.(16) In addition, wrecks were located in sonar scans in some of the coastal surveys undertaken for these projects.(17)

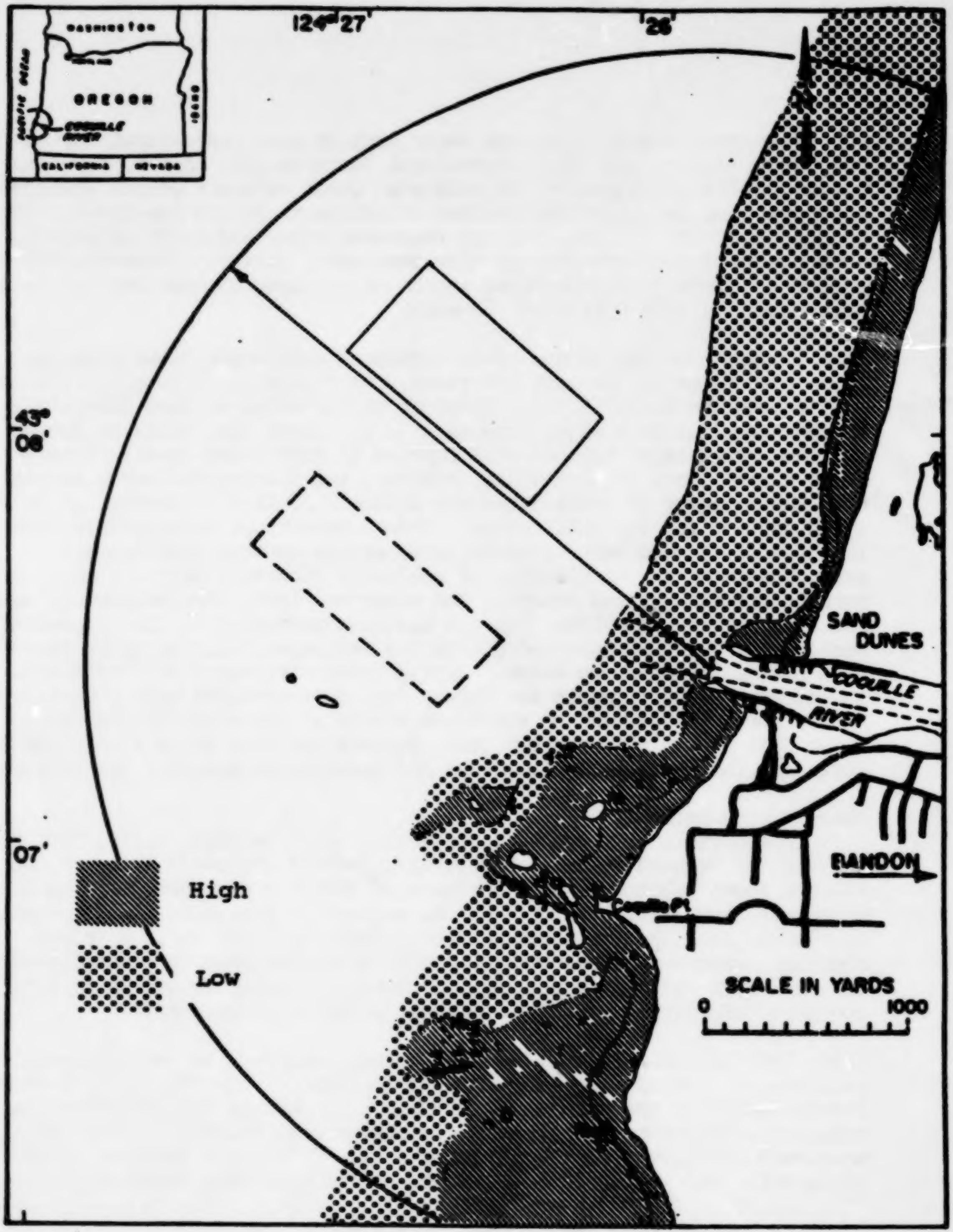
124° 27'
26'
43° 08'
07'
WASHINGTON
PORTLAND
PACIFIC OCEAN
OREGON
IDAHO
COQUILLE RIVER
CALIFORNIA
NEVADA
SAND DUNES
COQUILLE RIVER
BANDON
Coquille Pt.
High
Low
SCALE IN YARDS
0
1000

Figure E-2
Shipwreck Frequencies

1.17 One criticism of side scan sonar work is that its reliability is limited to discernible three-dimensional features.(18) Older wrecks may become indistinguishable to the side scan sonar as their wooden structures decay and they become a distribution of artifacts on the sea floor. These wrecks, important because they may represent older and rarer shipwreck sites, may not be discovered by side scan sonar surveys. However, the problem of identifying submerged wrecks on the Oregon coast may not be as significant as this criticism suggests.

1.18 Research on the Oregon coast indicates that wreck sites probably will be be restricted to the last 200 years, the frequency increasing from the 1850's into the early 1910's. Decay or obliteration of some identifying elements may not be a major problem. It is likely that hulls or buried outlines of hulls or ballast will survive in sufficient detail to define wreck sites. More significantly, however, the literature search reveals that the majority of wreck sites are probably located on beaches or in surf zones and not in deep water areas. Though exceptions are possible, the location of damaged vessels tends to be within shallow near-shore environments or in the vicinity of shallowly submerged obstructions. Once vessels are damaged and steering and power are lost, they become subject to currents, waves, and winds. In the examples presented in this appendix, vessels typically are damaged during the fall-winter-spring storm season with prevailing on-shore winds. During these circumstances, vessels damaged in near-shore environments are driven into surf zones or onto beaches. Approximately 80 percent of the known wrecks at the mouth of the Columbia River fall within this pattern.(19) Beaches and surf zones within the study areas are the most likely locations for discovering historic era shipwrecks.

Preservation Settings

1.19 Preservation environments, including human factors, will affect the survival of beached wrecks. Prehistoric Indians and early settlers and salvors found wrecked vessels a source of exotic goods, hardware, building materials, and wealth.(20,21) Wrecks exposed in near-shore environments or on beaches are likely to have been exploited for their various values. In contrast, wrecks in submerged locations, though exposed to other nonhuman environmental factors, are likely to contain a higher frequency of artifacts and more information depending on their state of preservation.

1.20 The following section of this appendix contains an evaluation of data pertinent to the specific project area in terms of the two cultural resource issues raised in the preceding discussion: 1) What is the potential for the disposal location to contain early prehistoric sites, and 2) What are the shipwreck conditions within the study area. This issue includes identifying wreck sites and evaluating the results of the side scan surveys.

Coquille Project Site Evaluation

1.21 Early Prehistoric Site Review. The most speculative portion of this appendix involves evaluating the disposal sites as a potential environment that might contain early prehistoric sites. This evaluation is limited to the late Wisconsinan glacial period exposures. The time-depth chart on page E-2 indicates that the project area would have been an exposed land surface between 10,000 and 20,000 years ago. That time frame is within the expected range of the late Wisconsinan migration from Asia to the North American continent and the probable time when these people may have migrated down coastal areas.

1.22 The topographic setting (appendix B, figure B-5) and the distribution of sediments suggest, however, that the preservation environment has been substantially degraded since these surfaces were exposed ground surfaces. The topographic setting indicates a relatively flat to minor slope extending to the west. There are no bedrock exposures, remnants of headlands, or indications of geological features that would have buffered a site from the effects of wave energy as sea level rose. Rather, project topography suggests an area where sediments contained in beaches and dunes would have been substantially reworked and redeposited over the developing sea floor. The sand/silt sediments present in the disposal site suggest that the current geological situation is relatively stable.(22) However, the currently accepted explanation for the presence of silts within the project area is that they are from the movement of materials dredged from the Coquille River and bar during recent historic times. Based on this information, the project area does not seem a likely candidate for the preservation of early prehistoric sites.

Historic Wrecks In The Coquille Study Area

1.23 Wrecks in the Coquille study area tend to occur in near-shore environments (table E-1). Frequent sites of wrecks include the bar at the mouth of the river with 5 wrecks, 25 percent; the north and south beaches with 10 wrecks, 50 percent; and an area approximately one-half to one mile outside the mouth of the river with 3 wrecks, 15 percent (figure E-3). The north and south jetties account for 2 wrecks, or 10 percent. Though the number of wrecks is relatively small, the percentage distributions support the basic characteristics of wreck locations along the Oregon coast. The highest frequency of wreck sites are within near-shore environments.

1.24 This wreck distribution reflects the late fall-winter-early spring storm period when wrecks are the most frequent (figure E-4). During this period the potential for navigational error or the consequences of damage to vessels by wind and storms, and the frequent shifts in channels at the mouths of rivers is magnified. Small errors have more significance than they do during more settled weather periods. During this period the characteristic on-shore winds tend to drive vessels damaged in near-shore environments into surf zones and onto beaches.

1.25 Late fall, winter, and early spring seasons define the storm period along the Oregon coast. Approximately 89 percent (16) of the wrecks from 1869 through 1953 occurred during this period. Of the late 18th-century wrecks, 6 out of 7, or 86 percent, occurred during this period.

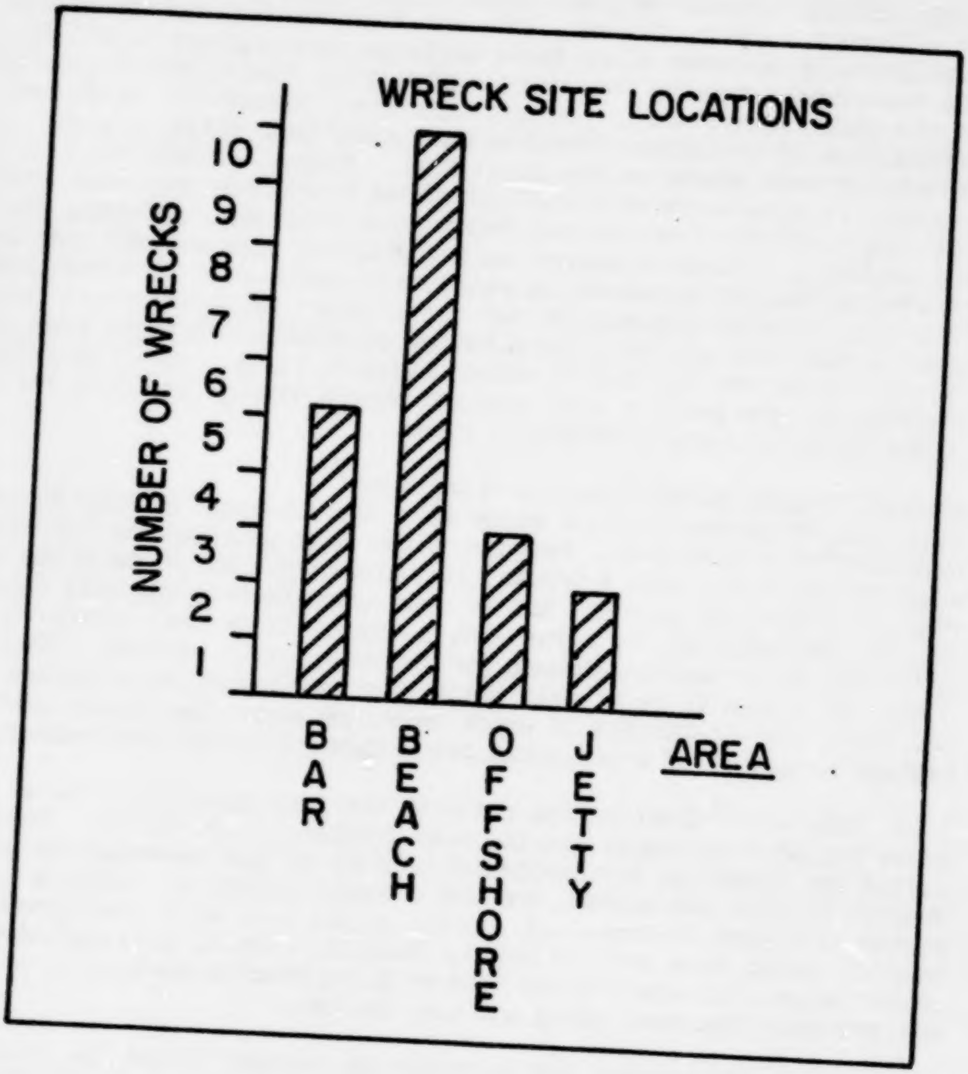

Figure E-3
Wreck Site Locations

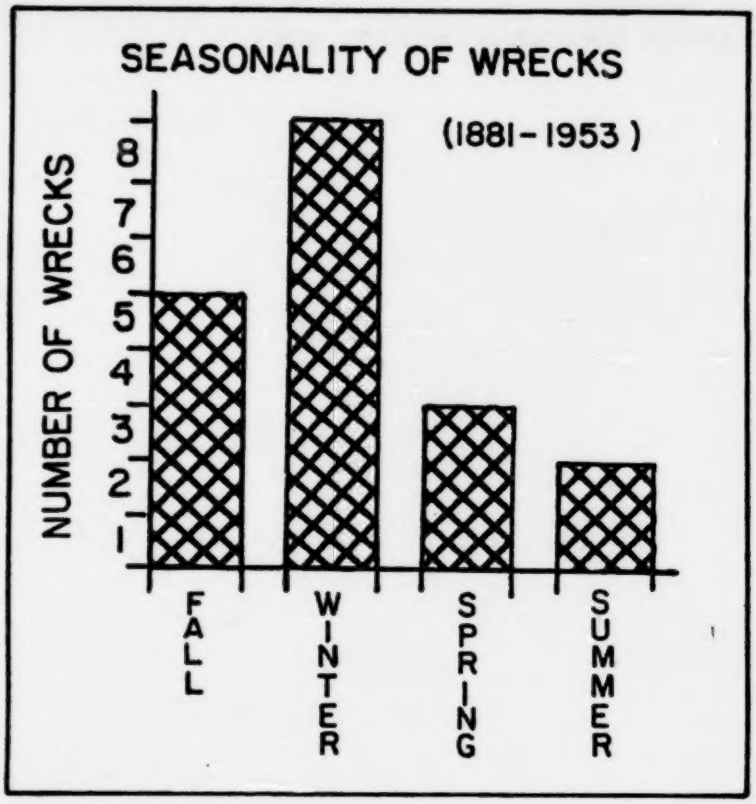

Figure E-4
Seasonality of Wrecks

1.26 The above information indicates that documented wreck sites in the historic period (1850-1917) occur primarily in near shore environments. This information is probably representative of the period before wreck events (pre-1850) are well documented. It is likely that, if there were wrecks in the Coquille area before 1850, they, too, will be found in the surf zones and beaches south of the Coquille River.

Side Scan Sonar Results

1.27 No shipwreck signatures were documented by the side scan sonar survey. The wrecks reported offshore were beyond the range of the survey. In addition, no wrecks were anticipated within the disposal area as it was located beyond the high probability zones.

Table E-1

Documented Wrecks in the Coquille Vicinity

Wreck Site/*Grounding Site if Reported

Date	Name (Type)	Cargo	Wreck Location	Reference
Dec 1869 (23)	ALASKA schooner		Coquille Bar	Marshall 1982:42
3May1870 (24)	OCCIDENT Barkentine		Coquille Bar	Marshall 1982:45 West 1952:417 Wright 1895 (25)
1876 (26)	MARY SCHOWNER		Coquille Bar	Marshall 1982:45
16Jan1877 (27)	OREGONIAN schooner		*Coquille River beached 5 miles south	Marshall 1982:46 West 1952:418 Wright 1895:256
Jan 1881 (28)	PRECURSOR scow-schooner		*Coquille R. Mouth - south beach, rocks	Powell 1881:2683
18Nov1889	PARKERBURG schooner		*Coquille River beached 1/4 mi below entrance	Marshall 1982:46
28Aug1895	BRAWNMORE steamer	general cargo	*Coquille River 15 miles south	Marshall 1982:43 West 1984:63
6Dec1897	MORO schooner, gas		Coquille Bar	Marshall 1892:45

Table E-1 (cont'd.)

Date	Name (Type)	Cargo	Wreck Location	Reference
30Nov1899	EUREKA schooner		*Coquille River north, beach	Marshall 1982:44
13Nov1904	WESTERN HOME schooner		*Coquille north beach	Marshall 1982:44
1905	DEL NORTE schooner, steam		Coquille offshore mouth	Marshall 1982:44
25Feb1905	ONWARD schooner		*Coquille Spit south beach	Marshall 1982:45 West 1984:61
29Jan1916	FIFIELD schooner, steam		*Coquille Bar south beach	Marshall 1982:44 West 1952:417
15Apr1915	RANDOLPH schooner		Coquille Bar	Marshall 1982:46
24Apr1915	"		"	West 1952:418
15Jun1917	SINALOA schooner, gas		*vicinity of Cape Blanco	Marshall 1982:46
31Oct1924	ACME schooner, steam	100 tons railroad iron	Coquille Bar *beached	Marshall 1982:42 West 1984:59
23Feb1927	MARY E. MOORE schooner, steam		Coquille River offshore in vicinity of Acme (1 mile)	Marshall 1982:45
1Jan1936	E. L. SMITH schooner, gas		*Rocks of Coquille Bar	Marshall 1982:44

Table E-1 (cont'd.)

Date	Name (Type)	Cargo	Wreck Location	Reference
29Mar1936	GOLDEN motor freighter		*Coquille north jetty	Marshall 1982:45
21Feb1943	YMS #133 mine sweeper		1/2 mile offshore	Marshall 1982:46
3Nov1953	OLIVER OLSON		*South jetty incorporated into jetty	Marshall 1982:45

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APPENDIX F

COMMENTS AND COORDINATION

APPENDIX F

COMMENTS AND COORDINATION

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1.01 Comments. F-1
1.03 Coordination. F-1

LETTERS

Concurrence Letter from Oregon Department of Land Conservation and Development

Concurrence Letter from Oregon State Historic Preservation Office

Concurrence Letters from National Marine Fisheries Service and U.S. Fish and Wildlife Service

APPENDIX F

COMMENTS AND COORDINATION

Comments

1.01 The Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA) requires that, for a site to receive a final ODMDS designation, the site must satisfy the specific and general disposal site criteria set forth in 40 CFR 228.6 and 228.5, respectively. The final designation procedures also require documentation of recommended disposal site compliance with MPRSA and with the following laws:

National Environmental Policy Act of 1969,
Endangered Species Act of 1973,
National Historic Preservation Act of 1966, and the
Coastal Zone Management Act of 1972, all as amended.

1.02 The data provided in this document was compiled to satisfy these laws and has been coordinated with appropriate and necessary State and Federal agencies.

Coordination

1.03 The procedures used in this ODMDS final designation study have been discussed with the following agencies:

Oregon Department of Fish and Wildlife
Oregon Department of Environmental Quality
U.S. Coast Guard
Oregon Division of State Lands
U.S. Fish and Wildlife Service
National Marine Fisheries Service, and
U.S. Environmental Protection Agency.

1.04 Following completion of a preliminary draft of this document, statements of consistency or concurrence were sought regarding three State or Federal laws. The statutes and responsible agencies are:

Coastal Zone Management Act of 1972, as amended	Oregon Department of Land Conservation and Development
National Historic Preservation Act of 1966, as amended	Oregon State Historic Preservation Officer
Endangered Species Act of 1973, as amended	U.S. Fish and Wildlife Service National Marine Fisheries Service

1.05 Consistency or concurrence letters from these agencies follow. State water quality certifications, as required by Section 401 of the Clean Water Act, will be obtained for individual dredging actions.

NEIL GOLDSCHMIDT
GOVERNOR

Department of Land Conservation and Development

1175 COURT STREET NE, SALEM, OREGON 97310-0590 PHONE (503) 378-4926

September 18, 1987

A. J. Heineman, Chief
Planning Division
Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

Dear Mr. Heineman:

Thank you for your letter requesting our concurrence that the Ocean Disposal Site Evaluation for the Coquille River navigation project is consistent with the Oregon Coastal Management Program.

My staff has reviewed the findings included in the draft document. The findings appropriately indicate that the most applicable mandatory enforceable policy in the Oregon Coastal Program is Goal 19, the Ocean Resources Goal. The findings conclude that the EPA Ocean Dumping Regulations meet Goal 19's inventory and impact assessment requirements. The Corps' evaluation indicates that the extent of rock exposures and proximity to reef shoals at the existing interim disposal site present both a hazard to the hopper dredges and potential for adverse environmental impacts. The report recommends designation of a new site north of the existing interim site. The new site contains fine sand almost exclusively. The sediment transport section of the evaluation indicates that use of the shallow end of the new site in early summer might allow material to be transported back toward the Coquille River entrance channel. The section included a recommendation that use of the proposed new site be contingent upon preparation of a disposal monitoring plan.

The Corps' findings indicate that the project is consistent with Goal 19's requirement that sites for the open sea discharge of dredged material not substantially interfere with or detract from the use of the continental shelf for fishing, navigation, or recreation, or from the long-term protection of renewable resources.

In conclusion, the Department concurs that the project is consistent with the Oregon Coastal Management Program provided the site is monitored to ensure that dredge material is not transported back toward the Coquille River entrance channel. Thank you for the opportunity to comment on the project. Please contact Patricia Snow of my staff if you have any further questions.

Sincerely,

James F. Ross
Director

JFR:PS/sp
<per>

cc: Glen Hale

NEIL GOLDSCHMIDT
GOVERNOR

Department of Transportation
STATE HISTORIC PRESERVATION OFFICE
Parks and Recreation Division
525 TRADE STREET SE, SALEM, OREGON 97310

October 26, 1987

Bernard M. Bishop
Natural Resources Branch
Portland District Corp of Engineers
PO Box 2946
Portland, OR 97208-2946

RE: Coquille River and Bar
Off-shore Ocean Disposal Site
Coos County

Dear Mr. Bishop:

Our office has reviewed the proposed project in T28S, R15W, Sec. 24 and the disposal site in T28S, R15W, Sec. 24 as a proposed permanent off-shore ocean disposal site for materials dredged from the Coquille River and bar. Since this area has been surveyed by site scan sonar and does not fit the historic shipwreck model, our office concurs that the proposed project would have no effect on any sites on or eligible for inclusion on the National Register of Historic Places.

If you have any questions you can contact our staff archeologist Dr. Leland Gilsen at 378-5023.

Sincerely,

D. W. Powers, Deputy
State Historic Preservation Officer

DWP:jn
BISHOP.DOC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
847 N.E. 19th Avenue, Suite 350
Portland, Oregon 97232-2279
(503) 230-5400

February 6, 1985

F/NWR5-359:AG

Richard N. Duncan
Chief, Fish and Wildlife Branch
Portland District Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208

Dear Mr. Duncan: Dick

This letter is in response to your request of January 17, 1985 for lists of threatened and endangered species under jurisdiction of the National Marine Fisheries Service (NMFS) that may be present in various offshore dredge disposal sites in Oregon.

The only listed species likely to occur in the areas you have designated is the gray whale, *Eschrichtius robustus*.

Sincerely,

Dale R Evans

Dale R. Evans
Division Chief

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Portland Field Office
727 NE 24th Avenue
Portland, OR 97232

RECEIVED
MAY 11 1987
NPPPL-FW

May 1, 1987

1-7-87-SP-92

Richard N. Duncan
Portland District Corps of Engineers
P. O. Box 2946
Portland, OR 97208-2946

Dear Mr. Duncan:

As requested by your letter, dated April 10, 1987, and received by us on April 16, 1987, we have attached a list of endangered and threatened species that may be present in the area of the proposed dredged material disposal sites located offshore of the Umpqua, Chetco, Coquille, and Rogue River entrances. From phone conversations with Geoff Dorsey of your staff, we understand these areas are located approximately one mile straight out from the river entrances in 60 to 90 feet of water and are about 1 square mile in size. The list fulfills the requirement of the Fish and Wildlife Service under Section 7(c) of the Endangered Species Act of 1973, as amended. The Corps of Engineers requirements under the Act are outlined in Attachment B.

Should your biological assessment determine that a listed species is likely to be adversely affected by the project, The Corps of Engineers should request formal Section 7 consultation through this office. Even if your biological assessment shows a "no effect" or "beneficial effect" situation, we would appreciate receiving a copy for our information.

Your interest in endangered species is appreciated. If you have any additional questions regarding your responsibilities under the Act, please call David M. Sill at our office, phone (503) 231-6179 or FTS 429-6179. All correspondence should include the above referenced case number.

Sincerely,

Russell D. Peterson
Field Supervisor

Attachments

cc: R1 FWE-SE
PFO-ES
ODFW (Nongame)
ONHP

5SP-92:05/01/87

RECEIVED
MAY 6 1987
REGULATORY BR.

Attachment A

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE PROPOSED DREDGED MATERIAL DISPOSAL SITES LOCATED OFFSHORE OF THE UMPQUA, CHETCO, COQUILLE, AND ROGUE RIVER ESTUARIES

STATE OF OREGON

1-7-87-SP-92

LISTED SPECIES[1/]

Brown Pelican	*Pelecanus occidentalis*	(E)

PROPOSED SPECIES

None

CANDIDATE

None

(E) - Endangered (T) - Threatened (CH) - Critical Habitat

[1/] U. S. Department of Interior, Fish and Wildlife Service, Jan 1986. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 and 17.12.

October 15, 1987

Planning Division (CENPP-PL-F)

Mr. Roland Schmitten
Regional Director
National Marine Fisheries Service
7600 Sand Point Way NE
BIN C15700
Seattle, Washington 98115

Dear Mr. Schmitten:

Pursuant to the Endangered Species Act, we are forwarding a biological assessment for gray whales at the Coquille River Entrance Offshore Disposal Area. This assessment is in response to your Feb. 6, 1985, listing of this species for the project. We contacted Mr. Joe Scordino of your Northwest Regional staff on October 14, 1987, to determine if the 1985 listing was still valid. He noted that the list should be updated to include humpback, fin, blue, Sei, and sperm whales, although these species apparently occur in very limited numbers along the Oregon coast.

The listing we received on Feb. 6, 1985, also covered designation of offshore disposal areas for Tillamook Bay Entrance, Depoe Bay, Siuslaw River Entrance, Port Orford, and Rogue River Entrances. We have not completed biological assessments for these projects; therefore, we request an updated list for these sites. We anticipate that the species listed for these projects will be the same as for Coquille River Entrance. It is also anticipated that our biological assessment will be no different as we are unaware of additional information and the projects are virtually identical. Thus, we request that you consider the biological assessment prepared for Coquille River Entrance as applicable to the offshore disposal locations listed above and thus, complete the coordination required for these projects under the auspices of the Endangered Species Act.

Your consideration of these matters is greatly appreciated.

Sincerely,

Richard N. Duncan
Chief, Fish and Wildlife Branch

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Northwest Region
7600 Sand Point Way NE
BIN C15700, Bldg. 1
Seattle, WA 98115

NOV 12 1987

F/NWR3:1514-04 js

Mr. Richard N. Duncan
Chief, Fish and Wildlife Branch
Department of the Army
Portland District Corps of Engineers
P.O. Box 2946
Portland, OR 97208

Dear Mr. Duncan:

This is in response to your October 15, 1987 letter regarding an Endangered Species Act biological assessment for the gray whale and other whales at the Coquille River Offshore Dredged Material Disposal Site. We have reviewed the biological assessment and concur with your determination that populations of endangered/threatened species under our purview are not likely to be adversely affected by the proposed action offshore of the Coquille River Entrance.

In regards to an updated list of endangered/threatened species for the other five offshore disposal areas noted in your letter, the original list of eight species sent to you in 1985 would still apply as no new species have been added. Although the species addressed in your Coquille River site assessment would also apply to the other five areas, we cannot consider it as a biological assessment for other sites because additional specific information must be included for each site. The additional information needed in the biological assessments for the other sites would include a site map, a project description, and an assessment of any unique aspects of the site in regards to endangered species. The project description portion of the assessment should include the seasonal timing and frequency of the disposal activity, the composition of the dredge material, the amount of material to be deposited (both during the season and during each dredging), and the water depths/location offshore of the disposal site.

This concludes consultation responsibilities under Section 7 of the ESA for the Coquille River Disposal Site. However, consultation should be reinitiated if new information reveals impacts of the dredge disposal activity that may adversely affect listed species or their critical habitat, a new species is listed, critical habitat is identified that may be affected by the activity, or the identified activity is subsequently modified. If you have any new information or questions concerning this consultation, please contact Joe Scordino at FTS 392-6140.

Sincerely,

Thomas E. Kruse

for Rolland A. Schmitten
Regional Director

APPENDIX G

COMMENTS AND RESPONSES FOR DRAFT EIS

APPENDIX G

COMMENTS AND RESPONSES

Six letters of comment were received on the draft Environmental Impact Statement, "Coquille, Oregon, Dredged Material Disposal Site Designation." Responses to comments generally appear alongside each comment.

Comment letters appear in the following order:

Federal Agency

Page
Department of the Interior, Bureau of Land Management G-2
Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service G-3
Department of Commerce, National Oceanic and Atmospheric Administration, Office of the Chief Scientist G-4
Department of the Interior, Office of Environmental Project Review G-6

Private Individuals or Companies

Howard R. Jones, Marine Taxonomic Services G-8

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
COOS BAY DISTRICT OFFICE
333 S. 4th Street
Coos Bay, Oregon 97420

IN REPLY REFER TO
1795

[illegible]

John Malek
Ocean Dumping Coordinator
Environmental Protection Agency
1200 Sixth Ave. WD-138
Seattle, WA 98101

Dear Mr. Malek:

We appreciate the opportunity to review the Draft Environmental Impact Statement "Coquille, Oregon Dredged Material Disposal Site Designation."

We do not have any specific comments to offer.

Sincerely,

District Manager

Underlined: __Response__: Noted.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
847 NE 19th AVENUE, SUITE 350
PORTLAND, OREGON 97232-2279
(503) 230-5400

DEC 14 1988
OFFICE OF
REGIONAL ADMINISTRATOR

DEC 12 1988

F/NWR5:809

Robie G. Russell
Regional Administrator
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Re: Coquille Ocean Dredged Material Disposal Site (ODMDS)

Dear Mr. Russell:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for the Coquille Ocean Dredged Material Disposal Site (ODMDS) Designation. The proposed ODMDS is an adjusted location lying north-northeast of an existing, interim-designated site. The proposed ODMDS was judged to be a safer location with less potential for adverse environmental effects. One benefit of the proposed ODMDS is that it has a sandy bottom substrate similar to dredged material from the Coquille River Federal navigation channel. The Federal navigation channel will be the primary source of dredged material to the proposed ODMDS. The DEIS states that the proposed ODMDS will be monitored for a period of time after a final designation is approved. Presently, no significant or long-term adverse environmental effects are predicted to result from designation.

Based on studies thus far completed, the National Marine Fisheries Service believes that the proposed ODMDS is more environmentally suitable for the disposal of dredged material than the present interim ODMDS. We therefore support the new designation.

We appreciate this opportunity to provide comments.

Sincerely,

Einar Wold
Einar Wold
Division Chief

cc: ODFW
ODSL
USFWS - PFO
COE - Portland District

DEC 15 1988
ESD EPA
REGION 10

Response: Support noted.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

Office of the Chief Scientist

December 20, 1988

RECEIVED
WRAS/404 REVIEW
EPA/REGION 10

Mr. John Malek
Ocean Dumping Coordinator
Environmental Protection Agency
1200 Sixth Avenue, WD-138
Seattle, Washington 98101

Dear Mr. Malek:

This is in reference to your Draft Environmental Impact Statement on the Coquille, Oregon, Dredged Material Disposal Site Designation.

We hope our comments will assist you. Thank you for giving us an opportunity to review the document.

Sincerely,

David Cottingh

David Cottingham
Director
Ecology and Environmental
Conservation Office

Enclosures

75 Years Stimulating America's Progress ★ 1913-1988

Response: Acknowledged. See following page for specific comments and responses.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
ROCKVILLE, MARYLAND 20852

DEC 15 1988

MEMORANDUM FOR: David Cottingham
Ecology and Environmental Conservation Office
Office of the Chief Scientist

FROM: Rear Admiral Wesley V. Hull, NOAA
Director, Charting and Geodetic Services

SUBJECT: DEIS 8811.02 - Coquille, Oregon, Dredged
Material Ocean Disposal Site Designation

The subject statement has been reviewed within the areas of Charting and Geodetic Services' (C&GS) responsibility and expertise. Since safety of navigation is one of C&GS' primary missions, this proposal was examined with that in mind. C&GS considers the maintenance of navigational projects to be extremely important and supports any programs that help accomplish this objective.

From a navigation point of view, it is never desirable to place materials in the ocean in the vicinity of ports, harbors, and channels. Sites off of the Continental Shelf would be preferable. However, since the primary purpose of the project is to improve navigation in the Coquille River and the proposed site is near an existing dump site, the preferred site appears to be the best alternative after considering all other factors. 1

The site is covered on NOS nautical charts 18580 and 18588, and all changes resulting from this project will be reflected on these charts. If appropriate, this information would be disseminated through Notices to Mariners and/or chartlets. 2

Should there be any need for further information about this response, please contact Mr. Erich Frey, Mapping and Charting Branch, N/CG22x2, WSC1, room 804, Nautical Charting Division, NOAA, Rockville, Maryland 20852, telephone 301-443-8742.

cc:
N/CG1x21 - Riggers
N/CG17 - Spencer (with attachment)
N/CG22x2 - Frey

DEC 19

Response 1: Comment noted.

Response 2: Acknowledged. A copy of the final EIS and designation rule will be provided to the appropriate NOAA office so that the information can be included on future charts.

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
500 N.E. MULTNOMAH STREET, SUITE 1692
PORTLAND, OREGON 97232

December 29, 1988

RECEIVED
[illegible]/104 REVIEW
EPA [illegible]

ER 88/988

Mr. John Malek
Ocean Dumping Coordinator
Environmental Protection Agency
1200 Sixth Avenue, WD-138
Seattle, Washington 98101

Dear Mr. Malek:

The Department of Interior has reviewed the draft Environmental Statement (EIS) for the Coquille Ocean Material Disposal Site Designation, Coos County, Oregon. The following comments are provided for your use and consideration when preparing the final document.

General Comments

The draft EIS for the subject site does not adequately address potential conflicts with future mining operations. The heavy mineral occurences noted northwest of the proposed site are exposed at the surface of the seafloor. In addition, other similar deposits are likely to exist elsewhere in the area under a coating of sand and silt. Additional information regarding future mining operations can be obtained from either the Federal/State of Oregon Offshore Placer Technical Task Force or the Bureau of Mines' Open File Report 4-87, entitled "An Economic Reconnaissance of Selected Heavy Mineral Placer Deposits in the U.S. EEZ." Both the Task Force and Open File Report could provide additional information on the resources and development potential off the coast of southern Oregon. 1

Specific Comments

Page EIS-9 Minimal Interference with Other Activities. Future mining operations should also be considered in the analysis of conflicting uses. 2

EIS-9, Minimizes Changes in Water Quality. It is stated that the dredged material is composed of "clean sand." Consideration should be given to the alternative of marketing the dredged material for local construction uses. 3

Page EIS 11, Sites Off the Continental Shelf. A comparative chart showing the costs for the alternative disposal proposal would be helpful in analyzing the economic impacts. The conclusion that it is uneconomical to dispose of dredged material beyond 1.5 miles off shore, on the continental shelf is questionable. The small additional transportation distance for the loaded hopper dredge should not significantly impact the economics of the dredging operation. 4

Page EIS 13 Types and Quantities of Material to be Deposited at the Site. The mineralogical makeup of the dredged material is not reported or discussed. The final document should address the presence of any heavy minerals of economic interest. 5

General Comment

Response 1: It is not within EPA or Corps authorities under the Marine Protection, Research, and Sanctuaries Act of 1972 to initiate offshore explorations for mineral deposits in final designation of ocean dumping sites. As indicated in this EIS (V. Environmental Consequences, Physical Effects), the site is located within a high energy zone. Currents in the area have in the past and are expected in the future to rapidly disperse disposed sediments broadly out of the site. No mounding has occurred on the site nor would we expect that material dispersing off the site would significantly contribute to concentrated mounding offsite. Accordingly, no significant conflict with future mining operations due to increased deposition or burial of mineral resources is anticipated. Navigational conflicts between mining vessels and dredges (or tug and barge operations, if used) are possible, but given the relatively light sea traffic in the area, we believe they could be adequately addressed on an action-specific basis. EPA, Region 10, would appreciate receiving future information identifying specific ocean mineral explorations within 10 miles of the coastlines of the States of Alaska, Washington, and Oregon. We will coordinate such information with the appropriate Corps District.

Specific Comments

Response 2: Future mining operations off the Oregon coast are presently speculative. These have been included implicitly in the assessment of navigation hazards and geological features.

Response 3: Designation of an ODMDS does not imply approval of specific dredging or disposal actions. These are separate regulatory actions permitted under section 103 of the MPRSA by the appropriate Corps District Commander, with independent review and concurrance by EPA. Alternate uses of the dredged material are routinely considered at that time.

The suggestion to "market" the clean sand for construction uses falls under the category of Beneficial Uses. In general, it is the policy of the Corps and EPA to promote beneficial use of dredged material that also results in the least environmental damage. Typically, alternative uses of dredged material fall into one of two categories: inwater and upland use. Inwater use has typically been to fill intertidal lands and wetlands, although examples exist of habitat creation or enhancement using dredged material. Upland use of dredged material frequently results in greater environmental damage (typically due to the salt content of the sediments) and usually involves additional expense by double-handling of the material.

Several other problems arise with marketing of material:

- Federal intervention with local marketing; and
- State ownership of the dredged sediment.

Page EIS-15, Offshore Mining Operations. The statement that "...most (mineral) exploration programs are scheduled for the outer continental shelf" is not accurate. Most attractive mineral resources are within State waters, less than 3 nautical miles from shore (Bureau of Mines OFR 4-87), and the States either have developed or are in the process of developing offshore leasing programs. 6

Thank you for the opportunity to comment.

Sincerely,

Charles S. Polityka
Regional Environmental Officer

Marketing of dredged material by a federal agency would potentially impact local businesses and has raised serious public concerns in the past. All dredged material from Coquille is under state ownership and presently would require royalty cost to the state in addition to dredging costs. Attempts have been made in a number of areas to make clean dredged material available for construction. At present, no demand has surfaced for this material.

Response 4: A Zone of Siting Feasibility (ZSF) was established by the Portland District based on existing logistical considerations which directly effect project economics. For example, the dredge *Yaquina*, dredges the Coquille project. Its time allocated to the Coquille project is limited to typically 8 days per dredge year. This is due to commitments to other Federal projects along the Oregon and Washington coast, to weather conditions, and anticipated dredge maintenance schedules. The quantity of dredged material to be removed and allocated dredge time to perform this work are largely fixed. The ZSF was estimated as the limit of haul to accommodate these limitations and to accommodate annual dredging needs along the coast. Some leeway, greater at some projects than others, does exist in the haul distance calculation. This is more on the order of an additional one-half to one mile scale as opposed to the additional ten to twenty miles to take the material off the continental shelf. As reported in the EIS, we could identify no environmental benefit to warrant the additional haul distances.

Response 5: As the dredged material is derived form the same littoral cell as the disposal site sediments, no significant deviation in mineralolgy is expected. Chemical analysis of sediments, when conducted, is for priority pollutants of concern to determine toxicity potential. Commercially exploitable metals or other compounds are not routinely evaluated unless they happen to be listed as a priority pollutant (e.g., chromium, mercury, etc.) Typically, both the Corps and EPA would rely upon information provided by the Department of the Interior or other appropriate agency with expertise.

Response 6: The statement in question pertains directly to offshore oil and gas deposits and not explicitly to minerals. The statement has been corrected in the final EIS.

Marine Taxonomic Services

5125 Crescent Valley Drive
Corvallis, OR 97330

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DEC 29 1988
WRAS/404 REVIEW
EPA/REGION 10

December 20, 1988

John Malek
Ocean Dumping Coordinator
Environmental Protection Agency
1200 Sixth Ave. WD-138
Seattle, Washington 98101

Dear Sir:

Marine Taxonomic Services is pleased to have been given the opportunity to review the Draft EIS on the Coquille, Oregon Dredged Material Disposal Site Designation Report.

7-8 A copy of these comments have also been forwarded to Mr. Rudd Turner at the Portland District Office of the U.S. Army Corps of Engineers.

Sincerely,

Howard R. Jones

Howard R. Jones
Director

kj

cc: Mr. Rudd Turner

Response: Acknowledged. See following page for specific comments and responses.

Marine Taxonomic Services

5125 Crescent Valley Drive
Corvallis, OR 97330

Review of the Coquille, Oregon Dredge
Material Disposal Site Designation Draft
Environmental Impact Statement

Comments:

EIS-31 Howard R. Jones, Marine Taxonomic Services (benthic macrofauna analysis) 1

General - The term 'aquatic' as used in the scientific realm is defined as pertaining to the fresh water environment and the term 'marine' pertains to the salt water environment. It is my feeling that in this report a change of terms is in order, i.e. change aquatic to read marine. 2

A-1 1.01 Information on marine benthic resources...conducted in June 1985. 3

A-2 1.09 The common name 'Sanddab' is not equivalent to the scientific name Isopsetta isolepis. I. isolepis is called a butter sole and Sanddabs belong to the genus Citharichthys. The usage here should be ..... Sanddabs (Citharichthys sordidus). ...

Table A - 2
Sanddab (Citharichthys sordidus)

A-5 1.18 1) The infaunal community of the north transect between ...

2) Genus and species names should be in italics or underlined i.e. Spiophanes bombyx, Eohaustorus, Mandibulophoxus and Rhephoxynius.

1.19 Polynoidae are not encrusting forms but do associate with rock and shell substrates.

1.20 Mean densities ($\#/m^2$) ... organisms/m^2

1.22 Maximum of $99/m^2$

1.23 $201/m^2$

1.27 ... clams to the inshore ...

Response 1: Correction made.

Response 2: The term "aquatic" is used throughout the EIS in its regulatory sense, i.e., pertaining either to marine, estuarine, or fresh-water environments and biota.

Response 3: Mr. Jones' clarifications to appendix A have been included.